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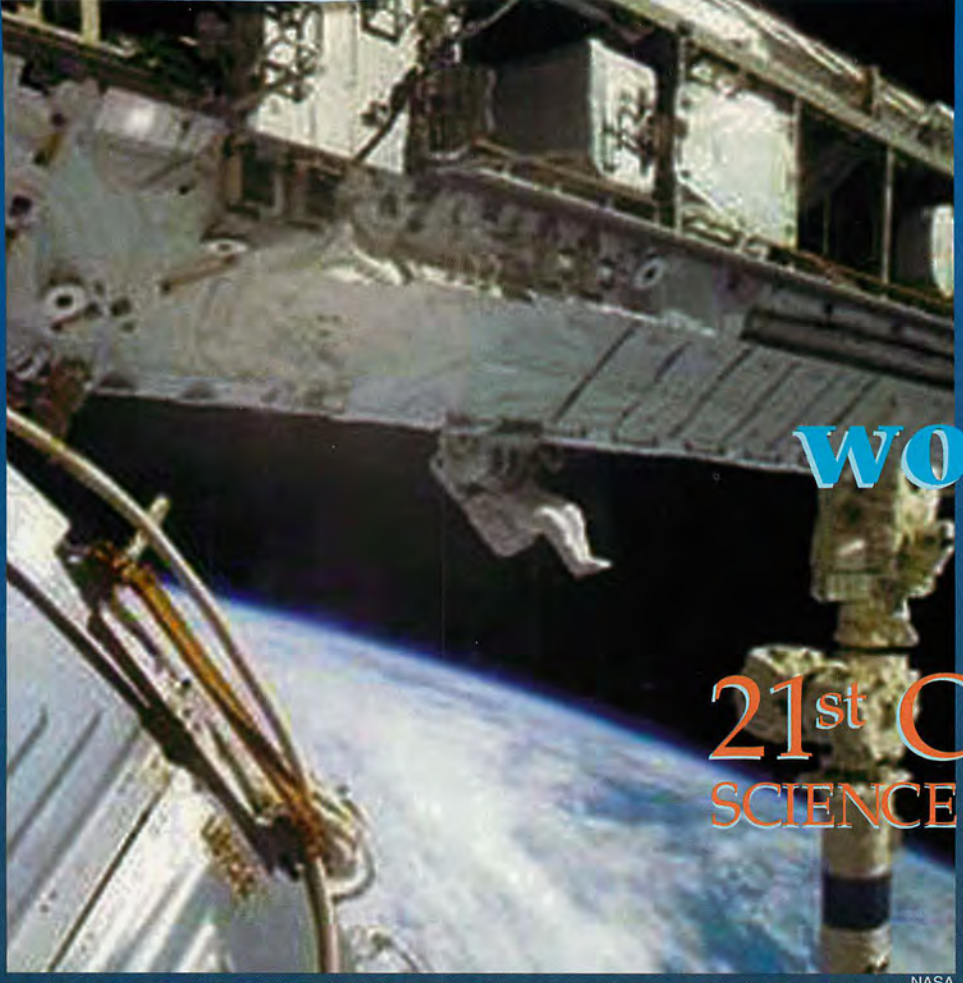

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21st CENTURY
SCIENCE & TECHNOLOGY

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C. Bablin/Unesco

Bertrand Russell, beating his phony peace drum at Unesco headquarters in Paris, 1957. His intellectual claim to fame, Principia Mathematica, *should long ago have been withdrawn from sale, and full refunds issued to the purchasers.*

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Marie Sklodowska Curie (1867-1934) in her laboratory.

On the cover: Neanderthal Man, as depicted on the frontispiece of *The Science of Life* by H.G. Wells and Julian Huxley (New York: Doubleday, Doran, 1931). Cover design by Alan Yue.

21stCentury Science & Technology (ISSN 0895-6820) is published 4 times a year in 2000, every third month, by 21st Century Science Associates, 60 Sycolin Road, Suite 203, Leesburg, Va. 20175. Tel. (703) 777-7473.

Address all correspondence to **21st Century**, P.O. Box 16285, Washington, D.C. 20041.

Second-class postage is paid at Leesburg, Va. and additional mailing of ices.

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Subscriptions by mail are $25 for 6 issues or $48 for 12 issues in the USA and Canada. Airmail subscriptions to other countries are $50 for 6 issues. Back issues are $5 each ($6 foreign). Payments must be in U.S. currency.

POSTMASTER: Send address changes to 21st Century, P.O. Box 16285, Washington, D.C. 20041-0285.

Printed in the USA ISSN 0895-682

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Science and the New Silk Road

The maiden voyage of the world's first commercial-scale, magnetically levitated railroad, running from downtown Shanghai to Pudong international airport, was a victory for a concept of international development which physical economist and international statesman Lyndon H. LaRouche, Jr., has been pushing for some time. This event of December 31, 2002, is a marker for something much, much bigger. It forms a part of an historic shift in world political and strategic alignments, of a sort very few among the ordinary run of strategists can even conceive.

As we shall briefly elaborate below, a change in millennium-old orderings of human economic and political relations is involved. Under these circumstances, a new Renaissance, dwarfing the great developments of the 15th Century, which gave birth to modern science and culture, becomes eminently possible. It is not a foregone conclusion, but a potentiality, as LaRouche, the behind-the-scenes shaper of these events, has identified it. To carry it through, the false paradigm governing modern scientific practice must change.

This is the crucial matter we address in the two historical studies contained in this issue. In the first study, on the Moonification of Science, we expose how the essential tenets of the Russell-Wells "no-soul" gang (that man is not different from a beast, and thought is no more than an epiphenomenon of matter), became the guiding principle behind the practice of science, and statecraft, in the 20th Century. In the second study, a biographical treatment of the extraordinary scientific career of Marie Sklodowska Curie, the same topic is addressed from the other side, by positive example. As the case of Pierre and Marie Curie illustrates, a relentless, and unrecognized, struggle for truth, giving up comforts and placing oneself at odds with all prevailing opinion, is the only means to actual scientific accomplishment.

But, we can not bring back the past. The culture which produced the genius of Pierre and Marie Curie is no more. How, then, shall we re-create it, or something better?

Science and Development

The answer to this life-or-death question lies in understanding the deeper connection among science, culture, and physical economy.

Scientific development and economic development, have ever marched shoulder to shoulder. It was no accident that the plan for the industrial development of Russia, which centered on railroad building, was conceived and fought for by chemist Dmitri Mendeleyev. Today, the development of the vast population centers of the interior of China, Southeast Asia, and India, and their linking across central Asia, to the developed industrial centers of Western Europe (and to the Americas, by way of a Bering Strait bridge or tunnel), depends on the development of high-speed rail lines.

In LaRouche's conception of this "new Silk Road," corridors of economic development, stretching 100 kilometers to either side of these magnetically levitated passenger and freight lines, will bring about the rapid modernization and improvement of living standards for the two-thirds of the world's population which now lives (mostly in squalor) in the Eurasian interior. That will change everything.

Just such a vision of human development has been the nightmare of the advocates of oligarchism and empire, including those now calling for a new American Empire, for over a century. Since Lincoln's victory in the Civil War, and the consolidation of America as the world's leading industrial power, the spread of the "American System" of industrial republic was the great fear of the British Empire. World history, from that point on, could only be understood from the standpoint of Britain's, sometimes desperate, efforts to prevent the adoption of the American System by powerful political

factions in other leading nations—Germany, France, Russia, and Japan, most especially.

The industrial development of the Eurasian interior will mark a millennial change in global economic and strategic relations. Human civilization, to date, has been, predominantly, maritime civilization. The density of protein-based food supply available from the sea, initially dictated the concentration of populations at coastal sites. Progress in astronomy and long-range navigational capabilities—much earlier than what mainstream archaeology usually acknowledges—permitted both trade, and settlement of other coastal regions. Development meant pushing inland, moving first up the rivers, and claiming inland territory for human habitation. But the cost of overland transport always prescribed a dependence on water routes for freight.

About 300 years ago, a maritime-financier oligarchy, which had dominated Mediterranean trade from the time of the fall of the Roman Empire, completed the relocation of its center of operations from Venice to London, producing what became the Roman-modelled British Empire. This Venetian rule was successfully challenged only once, by an international flanking operation, stretching over more than four generations from John Winthrop to Increase and Cotton Mather to Benjamin Franklin, and drawing on the continental networks of Gottfried Leibniz and his successors. The outcome was the American Revolution.

The development of Eurasia's interior, and the rail-linkage of Eurasia to the America's across the Bering Strait, is an event of equal or greater world historic significance. The availability of high-speed overland transport, and the development of the population centers of the interior of the Eurasian landmass, implies a great historical change. It will finally shift the international economic balance from maritime to land-based power.

With this shift, comes the possibility of freedom from the ideological tyranny of financier-oligarchical power, and a new Renaissance of science and culture. This will be a good time to be alive.

—Laurence Hecht

Some Holes in Cosmology

To the Editor:

We have astronomers and we have amateur astronomers. Among astronomers we have professional cosmologists. Unfortunately, in my opinion, the professionals have been lacking. Could amateur cosmologists do better with alternative cosmologies?

To wit: instead of positing the big bang, why not conceptualize a continuously evolving universe, and try to pinpoint the mechanisms of its evolution from lower to higher manifolds of order, culminating in intelligent life, intelligent life about to become the latest mechanism in the future development of the universe?

Is there any cosmologist, professional or amateur, who could guide us in resolving the paradox (among many paradoxes and connundrums) presented by not only dark matter, but now dark energy? Isn't positing dark matter and dark energy really an admission that we are asking the wrong questions about the universe?

What about quantized red-shifts?

Are black holes philosophical absurdities?

I have made a stab at being an amateur cosmologist. One of my tentative conclusions, is that it is a foible to look for life in other planetary systems, because the human species is developing exponentially, and will eventually fill up every nook and cranny of the universe with Earth's life forms, making other life-starts redundant. Can anyone gainsay this idea at the conceptual level?

Is action-at-a-distance gravity, an end-all, be-all explanation for planetary, stellar, association, cluster, galactic interactions? Why has no one been able to explain what gravity is, anyway?

Did an asteroid kill off the dinosaurs or was it the mundane angiosperm?

I have yet to read of a professional theorist who has quantified the stupendous uniqueness of life emerging on planet earth; tallying all the unique events in the fields of physics, astronomy, geology, chemistry, biology, genetics, etc. that had to occur in a precise order precludes the possibility of life ever repeating itself independently.

We are stuck with the spectacle of Timothy Ferris lugubriously positing, in his otherwise wonderful book, *Seeing in the Dark,* the putative heat death of the universe billions of years in the future! He never pauses to think that the human species, if it can only manage to continue its exponential development, without self-destructing, for just a few dozen more years, will be able to make the universe do figure 8's in the not-too-distant future.

Why haven't our eminent professional theorists handed the problem of gamma-ray bursters to a sharp engineer, and see if he can replicate the explosion here on earth, at least as a thought experiment?

It seems to me that we have a nuclear reactor of data being hooked-up to power a bicycle of empiricist interpretation. Empiricism has its rightful place in checking flights of fanciful Platonic conceptualization, but it cannot by itself generate fertile new ideas. To borrow a phrase from literary theory, we must aim for a higher discourse level in our beloved field of astronomy.

Julian Grajewski
grjwskleibniz@aol.com
Hamburg, Germany

Taking on the Eco-fascists

To the Editor:

It seems to me that once Lyndon LaRouche's influence obtains a critical mass in the United States, our next major adversary will be environmentalism. I think it would be extremely useful for political organizing, if a future issue of *21st Century* focussed on the subject, and provided concise discussions of the major sacred cows such as global warming theory, ozone depletion, pesticides, nuclear power, etc.

The main focus should be the issue of economic development, as environmentalists will present themselves as

Continued on page 72

Transrapid International

Chinese Prime Minister Zhu Rongji and German Chancellor Gerhard Schröder on the maiden voyage of the world's first commercial maglev train, from Shanghai to Pudong Airport (20 miles). The train reached a speed of 260 miles per hour (430 km), so smoothly that the water in the flower bowl did not spill.

WORLD'S FIRST COMMERCIAL MAGLEV TRAIN TAKES OFF IN SHANGHAI!

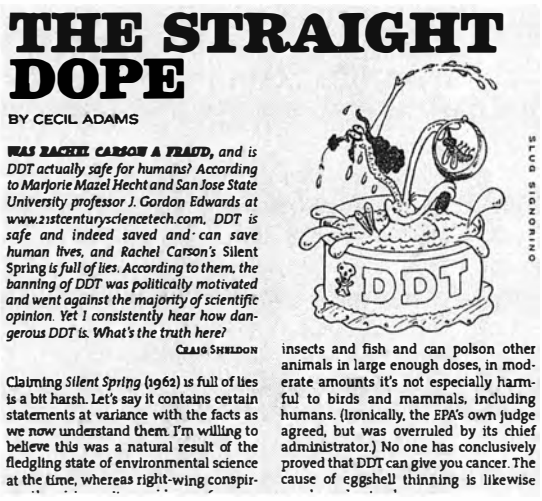
China inaugurated the world's first commercial, magnetically levitated train Dec. 31, in a ceremony attended by Chinese Prime Minister Zhu Rongji and German Chancellor Gerhard Schröder. The train runs between Shanghai's Longyang station and the international airport at Pudong, a distance of 31 kilometers (20 miles), and can achieve a speed of 260 miles per hour. The first track of the two-track system was completed in a record 23 months, in collaboration with the Thyssen-Krupp and Siemens German consortium that is manufacturing the Transrapid maglev system. The Germans provided the trains and many of the electrotechnical components, while the Chinese built the track, the stations, and some electrotechnical equipment.

The second line of the project will be completed by the end of 2003. Once full commercial operation is under way in 2004, the Shanghai-Pudong maglev train will be able to carry 10 million passengers per year. By 2010, when the World's Fair will take place in Shanghai, the system expects to handle 20 million passengers per year. Although maglev has been pursued in the United States since the 1960s, Germany and China are now way ahead.

China has two more maglev projects on the drawing board—Beijing to Shanghai (1,250 km) and Hangzhou to Pudong (240 km), and intends to begin manufacturing the trains in China. Maglev experts foresee the Chinese-German consortium building other systems throughout Asia, and worldwide.

CHINA LAUNCHES SHENZHOU IV, PRELUDE TO MANNED SPACE FLIGHT.

The fourth successful launch of an unmanned Shenzhou spacecraft was carried out just after midnight on Dec. 30, Beijing time. It is expected that this will be the last mission, before China makes history as the third nation to launch human beings into space. The mission is extraordinary in two respects. It was the first time that Chinese space officials had made the approximate launch date public beforehand (around the first of the year), indicating their confidence that the program could meet its goals on schedule. Second, according to space officials, this will be the last unmanned test mission for the Shenzhou-class of spacecraft, unless there is a problem with the flight. A manned flight is planned to take place in the latter half of 2003. The spacecraft was modified to "be a more comfortable place for astronauts to live in and work," said Qi Faren, lead designer of the spacecraft. Su Shuangning, commander and lead designer of astronaut systems, said Chinese astronauts had received training in the spacecraft before launch, for the first time.



THE STRAIGHT DOPE

BY CECIL ADAMS

WAS RACHEL CARSON A FRAUD, *and is DDT actually safe for humans? According to Marjorie Mazel Hecht and San Jose State University professor J. Gordon Edwards at www.21stcenturysciencetech.com, DDT is safe and indeed saved and can save human lives, and Rachel Carson's* Silent Spring *is full of lies. According to them, the banning of DDT was politically motivated and went against the majority of scientific opinion. Yet I consistently hear how dangerous DDT is. What's the truth here?*

CRAIG SHELDON

SLUG SIGNORINO

Claiming *Silent Spring* (1962) is full of lies is a bit harsh. Let's say it contains certain statements at variance with the facts as we now understand them. I'm willing to believe this was a natural result of the fledgling state of environmental science at the time, whereas right-wing conspir-

insects and fish and can poison other animals in large enough doses, in moderate amounts it's not especially harmful to birds and mammals, including humans. (Ironically, the EPA's own judge agreed, but was overruled by its chief administrator.) No one has conclusively proved that DDT can give you cancer. The cause of eggshell thinning is likewise

"The Straight Dope" column on DDT, Dec. 13, 2002, stirred up the regular readers.

***21ST CENTURY*'S 'BRING BACK DDT' CAMPAIGN MAKES NEWS**

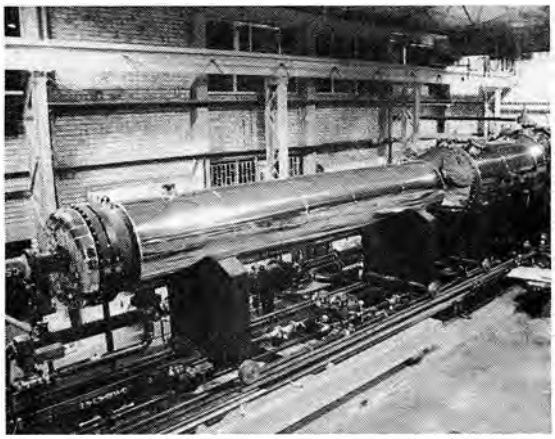
A call for bringing back DDT to combat mosquito-borne diseases in Malaysia, written by Mohd Peter Davis of Putra Malaysia University, was published in both major English-languages papers in Malaysia, *The Star* and the *New Straits Times* in January. Davis cites *21st Century* and the feature article by Dr. J. Gordon Edwards. "I share the public concern that dengue fever is approaching epidemic proportions claiming 54 lives in 2002 and 10,753 confirmed cases," Davis wrote. "We must get serious and unite to declare war on dengue. . . . Dengue and other mosquito-borne diseases such as malaria, yellow fever and encephalitis can be effectively controlled. Just bring back the insecticide DDT!"

In the United States, "The Straight Dope" column by Cecil Adams, which appears in 60 newspapers nationwide, took up a question about DDT from a reader who asked "Was Rachel Carson a fraud, and is DDT actually safe for humans . . . [as asserted by] Marjorie Mazel Hecht and San Jose State University Professor J. Godon Edwards at www.21stcenturysciencetech.com?" Mr. Adams attempts an even-handed reply, which apparently shocked many of his readers.

MILESTONE FOR SOUTH AFRICA'S PEBBLE BED NUCLEAR REACTOR

The Pebble Bed Modular Reactor (PBMR) project, under development in South Africa, successfully started up a test model of its power conversion system. This test rig, a micro-turbine model, is the first closed-cycle, multi-shaft gas turbine in the world. It was designed and built by the Faculty of Engineering at Potshefstroom University near Johannesburg. The tests demonstrated that the current configuration of the power conversion unit is stable and controllable. Tests of fuel element manufacture are also proceeding, making fuel particles using depleted uranium.

David Nicholls, the CEO of PBMR Ltd., announced the results in late November. He said that Eskom, the South African utility, intends to build a 125 megawatt-electric demonstration PBMR at Koeberg, near Cape Town, and an associated fuel plant near Pretoria. The concept allows for additional modules to be added as demand requires; commercial units are planned to be 165 MW each, with up to 8 modules per site.



Courtesy of PBMR Ltd.

Test model of PBMR's power conversion system. For more on the PBMR, see 21st Century, *Spring 2001, "South Africa's Supersafe Pebble Bed Reactor."*

EGYPT'S TOSHKA MEGA-PROJECT SET TO MAKE THE DESERT BLOOM

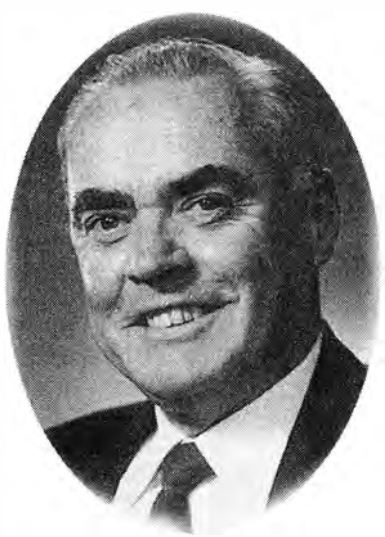
Egypt will launch a giant pumping station early this year, part of a mega-project to reclaim and cultivate some 540,000 acres around Toshka in southern Egypt. The South Egypt Development Project aims to double the amount of cultivated land in Upper Egypt, and draw 2 million settlers from Egypt's overcrowded cities, into new cities in the area. The station, supported by 21 pumps, was built to lift Lake Nasser water into the Sheikh Zayed canal, which is 164 feet higher. The Aswan High Dam, 240 kilometers (150 miles) to the northeast, will power the station, which will pump water from Lake Nasser, the reservoir created by the dam, 50 km west of the Sheikh Zayed canal. The water will be channelled by four sub-canals into 540,000 acres of potentially fertile desert land. The Aswan Dam, built in the 1960s, has allowed the reclamation of more than 1 million acres, and multiple crops per year.

TOO MANY 'BARE STICKS' LEAD TO WAR, SAYS *POPULATION PRESS*

The latest population scare story, promoted in the *Population Press* for November-December 2002, is not only that there are too many people in the world, but that too many of them are young "rogue males"! These "surplus males" are called "bare sticks" by the Chinese, because they are unlikely to find a marriage partner. "Thus," writes Donald A. Collins in the *Population Press* "their behavior follows a broadly predictable pattern, prone to seek satisfaction through vice and violence." Collins quotes an academic study titled "The Security Logic of High Sex Ratio Societies," which warns of wars to come in Asia, where the sex ratios "are being skewed in favor of males on a scale unprecedented in human history." Hasn't author Collins heard of education and industrial development---or are those considered too "rogue" for a member of the board of directors of the Population Institute?

IN MEMORIAM: PETER A. TOYNBEE (1923-2002)

Peter Toynbee, a retired chemical engineer who battled with his pen against the global warming lobby and other environmental hoaxes, died in New Zealand July 7, 2002. In addition to writing articles, books, and letters to newspapers on climate and atmospheric science, Mr. Toynbee championed the distribution of *21st Century* magazine throughout New Zealand. His first career was as an industrial chemist, and he was a National Research Fellow and a Fellow of the Institute of Energy in London. In the 1960s, he became interested in coal as an energy source, while working with the New Zealand Department of Scientific and Industrial Research, and he went on to found the New Zealand Coal Research Association. His second career, as a fighter against the unscientific arguments of the environmentalists, put him into the public focus after his retirement in 1988. He was a good friend of *21st Century,* and he will be missed.



Peter A. Toynbee (1923-2002)

MOONIFICATION OF THE SCIENCES

The Russell-Wells 'No-Soul' Gang Behind the Moonie Freak

by Laurence Hecht

"It is just that unwillingness to think evil, . . . that may presently erase the British from the scroll of living significant peoples."
—H.G. Wells,
Experiments in Autobiography

Back in the 1970s, when the Reverend Sun Myung Moon's Gnostic Sex-Cult Freak Show was in its mass recruiting phase, the "Moonies" were the American parent's worst nightmare. Moon was the zombie-maker, the body-snatcher, who came in the night—or when the children were away at college, and stole their souls away. There was much basis in fact for this fear, as anyone who had ever looked into the vacant eyes or attempted to converse with the vacated mind of a "Moonie" will recall.

Today, this lunatic leader of a mass cult is the titular head of a multitrillion-dollar, worldwide apparatus of government influence-peddling and control that knows no equal. Moon literally owns whole countries in South America and Asia. His apparatus is rapidly buying up the U.S. Congress, the Presidency, and all potential opposition forces of left, right, and center. Moon's stock-in-trade is cash and sex—lots of it. The cash comes from the worldwide drug- and gun-running operations, part of which came to the surface in the Iran-Contra scandal: cocaine from the South American trade run under cover of the Moon-linked CAUSA group; heroin from Afghanistan and the Far East, laundered through dirty-money operations of the Moon cult that overlapped Ollie North's extracurricular activities while at the National Security Council.

The sex is a specialty of Moon's own Gnostic "family" cult. Remember the Congressional Madam scandals of the 1970s, featuring Tong Sun Park and Suzy Park Thomson? That was just the tip of the iceberg of "The Reverend" Moon's sexual-favors operation. Military intelligence officers who investigated Unification Church operations in Washington in the 1970s and 1980s, report that the recruitment device used on ranking, conservative political and military officials was to hold weekly orgies, arranged by Col. Bo Hi Pak, the Unification Church official who was a top officer of the Korean Central Intelligence Agency (KCIA). The special treat at these affairs were the "Little Angels"—Korean schoolgirls brought over by Moon as a singing group. The photo files from these sessions are reported to be a powerful influence in certain circles to this very day.

But they didn't stop at Congressmen and high-ranking military. Moon now owns the religious right from Jerry Falwell to Gary Bauer, and has bought up most of the independent black ministers, the former base of the civil rights movement, to boot. Moon uses his ample supplies of money, gold-plated watches minted in his own factories, and his private stock of "Asian brides" for the most corrupt. Moon also owns a substantial chunk of the business operations of Louis Farrakhan's Nation of Islam. Farrakhan has been appearing regularly at Moon-sponsored events since 1996, in one case on the same podium with

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Laurence Hecht is editor-in-chief of 21st Century *magazine. This article first appeared in* Executive Intelligence Review, *Dec. 20, 2002.*

Show

AP / Wide World Photo

Above: Nobel physicist Eugene Wigner shares the podium with Reverend Sun Myung Moon at the 1978 International Conference of the Unity of Sciences. Wigner helped organize the merger of the Unification Church with Bertrand Russell's Unity of Science cult.

The fraudulent depiction of a so-called Neanderthal Man, emphasizing the beast in man, was the frontispiece of H.G. Wells and Julian Huxley's 1931 The Science of Life (*New York: Doubleday, Doran).*

former Attorney General Richard Thornburgh, and former Vice President Dan Quayle. After the events of 9/11, Moon focussed his sights on the traditional Muslim religious community, and is making inroads into mosques across America.

Moon also runs the central control points of world academic opinion. Through his International Conferences for the Unity of Science and Federation of World Professors, Moon pays six-digit honoraria to leading scientists, with emphasis on using their reputations to promote population control, artificial intelligence, and world federalism. Moon owns the second

major daily in the national capital of the world's greatest power, the *Washington Times,* and the second largest wire service, United Press International. He controls industries around the world, ranging from food production and distribution to arms manufacture, including the original producers of the Thompson sub-machine gun.

Senator Joseph Lieberman, a putative Democratic presidential candidate, recently received the 2002 Truman-Reagan Freedom Award from the Moonie front group, the Victims of Communism Memorial Foundation. In 2000, Senator John McCain, who has mooted a third party run for the presidency, presided over the award presentation. The president of this Foundation, Lee Edwards, is the editor of the Sun Myung Moon magazine, *The World and I.* Its public liaison officer is society editor of Moon's *Washington Times.* Included on the National Advisory Council of this Moonie front are: former National Security Adviser Zbigniew Brzezinski; former Senators Robert Dole, Dennis DeConcini, and Claiborne Pell; former UN Ambassador and now head of the American Enterprise Institute Jeane Kirkpatrick; the head of the Heritage Foundation; and many more officials of "respectable" organizations and talking heads you see on television every day.

So Who, or What Is Moon?

So who really is the Reverend Sun Myung Moon, and what is behind him? The answer is not what you think. The Moon operation is not a simple case of penetration by a foreign intelligence agency. He is neither a right-wing conspiracy, nor a Communist plot, nor a creation of Jewish bankers. Nor is he the special property of some all-powerful secret society, as dreamed of by some populist-minded conspirophile.

To understand what makes the Moon clock tick, is to know the real history of the 20th Century, not the fairytale version set forth in schoolbooks and newsstand gossip sheets. We shall show you in this article that the Moon cult is the spinoff of two British intelligence operations of the 1920s and 1930s, in which the figures of Bertrand Russell and H.G. Wells play the prominent role. We shall begin by briefly summarizing these two operations. Then, to make sense of them, we shall go back in history to the beginning of the past century, and even a bit earlier, to discover the motives and means by which these things could be carried out. It is a shocking story, but a coherent one. Stay focused, and you can grasp it.

The two operations of Wells and Russell from which Moon sprung are these:

1. The **Moral Re-Armament Movement,** founded at a 1921 meeting between a wacky Lutheran preacher from Philadelphia and two British delegates to the Washington Disarmament Conference, Lord Arthur Balfour and H.G. Wells. Moral Re-Armament became the mass organizational vehicle for implementation of Wells's 1928 call in *The Open Conspiracy,* for a worldwide movement for draft resistance. The environment of Moon's Korean ministry was under control of Moral Re-Armament when he was picked up as an intelligence asset during the Korean War.

2. The **Unity of the Sciences** movement. Founded in 1935 under the supervision of Lord Bertrand Russell and John Dewey, it brought together Trotskyite academics Albert Wohlstetter (mentor of current Defense Policy Board Chairman Richard Perle), Sidney Hook, and Ernest Nagel, with members of the radical-positivist Vienna Circle. Merging with Robert M. Hutchins at the University of Chicago in the 1950s, this operation took over the teaching of science in the United States. Thomas Kuhn's widely read fraud, *The Structure of Scientific Revolutions,* was published as the second volume of their *Encyclopedia of Unified Sciences.* In 1972, the Moonies were given the Unity of Sciences franchise, sponsoring the first of their still-ongoing International Conferences of the Unity of Sciences. Their early sessions featured such notables as Manhattan Project physicist Eugene Wigner, the lifelong ally of that truly mad scientist Leo Szilard (the model for Dr. Strangelove, in Stanley Kubrick's film of that name), and environmental fascists Alexander King and Aurelio Peccei, founders of the no-growth Club of Rome.

Before looking back to the history of these projects, let us first briefly dispense with the person of Rev. Sun Myung Moon. Moon as a personality is of very little importance, in himself. The real Reverend Moon is a pathetic, if nonetheless nasty, victim of Japanese internment and North Korean torture sessions. He is what the professional mindbenders who operate under military intelligence cover call a synthetic personality, just the right sort of material for running a cult operation. Born in 1920, Moon had received some training as an engineer when he was first imprisoned by the Japanese during their extended occupation of Korea. Early in the Korean War, Moon was taken prisoner in the North and subjected to the hideous physical and mental torture that became well known to Americans of the time. Moon describes his so-called religious conversion while in North Korean imprisonment as "my brainwashing."

A sample or two of Moon's "philosophy" tells it all. Here is the Reverend Moon on the subject of the meaning of life:

> The purpose of Life, into which we all are born, for a man is woman, and for a woman is man. Man and woman are born to live for each other. The harmony of their body shapes, and of their organs of love are simply made so.
>
> If you truly understand this fact, you have mastered more truth and more precious wisdom than an entire encyclopedia. God, the Great King of wisdom, has placed our organs of love in each other's custody. Thus the true master of the organ of love which a man or woman possesses is not that person at all, but is their loving spouse. . . .

He made these comments before the 15th conference of the International Conference on the Unity of Sciences in 1986. Moon has something of an obsession with sex and the sexual organs. A former Moonie and leader of one of Moon's pro-Vietnam War front groups, recalled this anecdote:

> I remember a day at Belvedere [the Moonies' Tarrytown, New York training camp] in May of 1973 during a leadership conference. Moon had just finished a short speech, and he then asked for general questions. I rose to my feet to address him. I said, "as a One World Crusade Commander, I frequently encounter the problem of homosexuality among our men." I asked him if there was anything we could do to help these people.
>
> He replied: "Tell them that if it really becomes a prob-

C. Bablin/Unesco

Unity of the Sciences founder Bertrand Russell. Russell is pictured at UNESCO House in Paris in 1957, at the time his Pugwash operation to use fear of nuclear war to force surrender to world government was in full swing.

lem to cut it off, barbecue it, put it in a shoe box, and send it to me." The audience roared with laughter.[1]

Or another sample of the profound depths of Moon's thought:

> When you defecate, do you use a mask? This is no laughing matter, this is serious. When you were kids, did you ever taste the cooties from your nose? . . . Why didn't you feel they were dirty? Because that's a part of your body. The Reverend Moon has discovered something that no one else had thought about.[2]

1. It All Began at Appomattox

If the lunatic Moon is not the maker of his own madhouse, who is? The best way to answer that question is to take a closer look at the designers of the operation that produced Moon, and the forces which shaped them.

1. Allen Tate Wood, "My Four and One Half Years with The Lord of the Flies" (www.allentwood.com/myfour.html).
2. Statement by Reverend Moon at the Nov. 23, 1996 opening ceremony of *Tiempos del Mundo* newspaper in Buenos Aires.

Introducing: Russell and Wells

Most literate people know Herbert George (H.G.) Wells as a writer of science-fiction stories. Bertrand Russell, his chief partner in evil, is best known as a philosopher, mathematician, human rights activist, and pacifist—this, despite his repeated calls for a pre-emptive nuclear strike against the Soviet Union, and his often-expressed desire that the spread of epidemic disease might reduce the world's population every generation or so. Yet even with such correction (the truth of which the present-day Russell acolyte, Noam Chomsky, was forced to concede at a recent public appearance at Rice University in Houston), one does not arrive at a true picture of these men, or their role in the world.

Russell and Wells, who orchestrated so much of the evil of the 20th Century, were by birth and upbringing, men of the 19th Century, grown to manhood under the British Empire at the peak of its power, nursed on the tales of Kipling and the notion of the inborn superiority of the Anglo-Saxon race. Yet, they were clever enough to foresee its demise, and early on set themselves to the task of shaping a new world empire, more fearful and more evilly conceived than the openly declared global tyranny which was Victorian England. In his *Experiments in Autobiography,* Wells wrote of his own childhood:

> In those days I had ideas about Aryans extraordinarily like Mr. Hitler's. The more I hear of him the more I am convinced that his mind is almost the twin of my thirteen-year-old mind in 1879; but heard through a megaphone—and—implemented. I do not know from what books I caught my first glimpse of the Great Aryan People going to and fro in the middle plains of Europe, spreading east, west, north, and south . . . whose ultimate triumphs everywhere squared accounts with the Jews . . . I have met men in responsible positions, L.S. Amery, for example, Winston Churchill, George Trevelyan, C.F.G. Masterman, whose imaginations were manifestly built upon a similar framework and who remained puerile in their political outlook because of its persistence.

(Wells only fails to note that the similarity of Hitler's outlook to the British one arises because Hitler was, like Moon, a synthetic personality and product of British-intelligence occult bureau and psywar penetration operations run into Germany at the beginning of the century.)

The Russells were an English noble family that came to prominence in the reign of Henry VIII, with the rise of John Russell, First Earl of Bedford. The Earl Bertrand Russell (1872-1970) of whom we speak, was the grandson of Lord John Russell (1792-1878), twice prime minister during the reign of Queen Victoria. Grandfather Russell, who raised young Bertrand, was an intimate of British spymaster and longtime head of the Foreign Office, Lord Palmerston. Palmerston managed a veritable zoo of agents of all stripes, particularly of the radical anarchist, and communist variety—Mazzini, Bakunin, and Karl Marx among them. A specialty of the house was the technique that came to be known as "Balkanization," the breaking up of a nation or opposing

empire into divided parts. China, India, and much of Africa were subjugated this way, and Europe and Russia successfully held at bay.

But the great prize was the United States, the lost colony, whose reconquest was a central concern of British policy from 1783 onward. The Civil War was the last great effort to accomplish this goal by force of arms. Palmerston's agents in the Confederacy included Secretary of War Judah Benjamin and Teddy Roosevelt's uncle, James Bulloch. But Palmerston lived just long enough to see the defeat of the Confederacy, Lee's surrender at Appomattox, and the immediately following assassination of President Lincoln by one of his disposable agents.

By the time that Palmerston died on Oct. 18, 1865, the world was forever changed. The United States was now a land power, with the greatest army on the face of the Earth, and an industrial base that would shortly surpass England's own. If it was to be reconquered, it would have to be by subversion and deceit. The question of how, exactly, that might be accomplished, occupied the thought and discussion of several generations of the British elite.

Agnostics and Gnostics

Bertrand Russell came to his position by birth.[3] Herbert George Wells (1866-1946), who played Sancho Panza to Russell's Don Quixote, was a commoner, the son of a gardener and a house servant. Wells first gained access to the upper classes through the encouragement of Thomas Huxley, a biologist and prominent figure in the British intellectual elite. In 1884, the 18-year-old Wells received a scholarship from the London Department of Education to study at the Normal School of Science in South Kensington. His chosen field was biology; his teacher Thomas Huxley. Here was Huxley's view of the science of biology, as described in an 1889 essay, "The Nineteenth Century":

> I know of no study which is utterly saddening as that of the evolution of humanity. Man emerges with the marks of his lowly origin strong upon him. He is a brute, only more intelligent than the other brutes, a blind prey to impulses, a victim to endless illusions, which makes his mental existence a burden, and fills his life with barren toil and battle.

Wells broke off his science education to pursue a writing career. Through Huxley, Wells gained entree to his first publisher, Astor's *Pall Mall Gazette,* and later to fellow Metaphysical Society member Lord Arthur Balfour. Ten years after leaving college, Wells wrote of Huxley, "I believed then he was the greatest man I was ever likely to meet, and I believe that all the more firmly today."

H.G. Wells, as a biology student, poses with human and primate specimens from the cabinet of the evil Dr. Huxley. "Man emerges with the marks of his lowly origins upon him," wrote Thomas Huxley.

The key to the evil worldview of both Russell and Wells is already summarized in the philosophy of Huxley, an influential figure among *avant garde* intellectuals at the height of the British Empire. He was a leading member of the Metaphysical Society, which was founded in 1869 in an attempt to forge a more effective intellectual elite out of the membership of the Oxford Essayists and Cambridge Apostles. At a meeting of the society, Huxley coined the term *agnosticism,* an idea that would play out later in the conceptions of Wells, Russell, and the followers of the Reverend Moon. The atheist denied God exists. The agnostic left that question open. Instead, he denied the ability of man to actually know anything. Here in this conception, actually only a re-working of a metaphysics common to Aristotle, Hume, and Kant, was the "no-soul" doctrine which is at the heart of the Open Conspiracy. Huxley outlined the tenets of his agnosticism before a meeting of the British Association for the Advancement of Science in 1874:

> No evidence can be found for supposing that any state of consciousness is the cause of change in

3. Russell's perversely warped attitudes toward his fellow man may find partial explanation in the perverse circumstances of his early life. Bertrand Russell was born on May 18, 1872. Before the age of four, he had lost both his parents, and in the midst of a shocking scandal, landed at the Richmond Parks Estate of his grandfather, Lord John Russell. The tale unfolded as follows.

When Bertrand's mother succumbed to diphtheria in 1874, the father John (Russell) Lord Amberley, anxious over his son's religious upbringing, appointed as guardians two men who were avowed atheists. The first was his own godfather, Cobden-Sanderson. The second was D.A. Spalding, a young biologist in the Huxley mold, specializing in the study of animal instincts. Spalding was already serving Lord and Lady Amberley as tutor for Bertrand's older brother, and entered an advanced stage of consumption while in the family's employ.

When Bertrand's father died, two years after his mother, Lord Amberley's papers revealed the reason why Spalding could never become the legal guardian. As the adult Russell later described it: "Apparently upon grounds of pure theory, my father and mother decided that although [Spalding] ought to remain childless on account of his tuberculosis, it was unfair to expect him to remain celibate. My mother, therefore, allowed him to live with her, though I know of no evidence that she derived any pleasure from doing so." Upon disclosure of this matter after the father's death, both Spalding and Cobden-Sanderson renounced their claims, and the young Russell thus ended up with his wicked grandfather. (See, Ronald W. Clark, *The Life of Bertrand Russell* [New York: Alfred A. Knopf, 1976], pp. 23-26.)

There is a reason behind every evil. To know what makes an adversary so, as Shakespeare's *Henry VI, Part 3* explains the case for the consummate tyrant Richard III, is to better know how to bring forth good from his defeat.

the motion of matter of the organism. . . . The mind stands relegated to the body as the bell of the clock to the works, and consciousness answers to the sound which the bell gives out when it is struck.

We will find this same view enunciated later by Wells, Russell, and the Ernst Mach-influenced Vienna Circle which gave rise to Russell's Unity of the Sciences movement in the mid-1930s. But agnosticism, is only Gnosticism in disguise, and in this form, as a reincarnation of the ancient cult heresy, we shall find it at the heart of the "theology" of the Reverend Sun Myung Moon.

The Coefficients

In his autobiographical account, written years later, Wells described the dilemma facing Britain at the time he was attending the monthly sessions of the elite Coefficients Club. The Coefficients was a cross between a diners' club and a modern think-tank, which met monthly over dinners at London's St. Ermin's Hotel from 1902 to 1908.

Among the members of this unappetizing group was the powerful Lord Robert Cecil, elder statesman of Britain's most powerful family, and cousin to Arthur Balfour, then serving as Conservative Prime Minister. Lord Alfred Milner, the High Commissioner to South Africa, was a regular. A factional ally of Milner's in the serious debate that went on at these affairs was Halford Mackinder, the newly appointed head of the London School of Economics and originator of the doctrine of geopolitics, who Hitler's ghostwriter for *Mein Kampf,* Maj.-Gen. Karl Haushofer, acknowledged as his source. Another Milner ally was Leo Amery, later intimate of Winston Churchill. The Earl Bertrand Russell was there, sometimes making up a faction of one. The Viscount Edward Grey, a hereditary peer who was to play a crucial role in shaping the post World War I era, attended regularly. Sidney and Beatrice Webb, Fabian socialists who would soon embrace Benito Mussolini, were regulars. The Webbs, who were solidly middle-class academics, were credited with having organized the group, most of whose members became part of a later formation, known variously as the Round Table, Milner's Kindergarten, and the Cliveden Set. The name Coefficients might have been a play on Mrs. Webb's incessant references to improving "efficiency" in government.

Here is how Wells recalled the situation facing the Coefficients at the beginning of the 20th Century:

> The undeniable contraction of the British outlook in the opening decade of the new century is one that has exercised my mind very greatly. . . . Gradually, the belief in the possible world leadership of England had been deflated, by the economic development of America and the militant boldness of Germany. The long reign of Queen Victoria, so prosperous, progressive, and effortless, had produced habits of political indolence and cheap assurance. As a people we had got out of training, and when the challenge of these new rivals became open, it took our breath away at once. We did not know how to meet it. . . .
>
> [O]ur ruling class, protected in its advantages by a universal snobbery, was broad-minded, easy-going, and profoundly lazy. . . . Our liberalism was no longer a larger enterprise, it had become a generous indolence. But minds were waking up to this. Over our table at St. Ermin's Hotel wrangled Maxse, Bellairs, Hewins, Amery, and Mackinder, all stung by the small but humiliating tale of disasters in the South Africa war, all sensitive to the threat of business recession, and all profoundly alarmed by the naval and military aggressiveness of Germany, arguing chiefly against the liberalism of Reeves and Russell and myself, and pulling us down, whether we liked it or not, from large generalities to concrete problems.[4]

There were genuine differences as to how the defeat of the "new rivals" was to be accomplished, but no dispute as to the goal. The majority opinion converged on war, to set the European powers at each other's throats. The seeds of that war, pitting France against Germany, Germany against Russia, and Russia against Japan, had already been sown in the decade of the 1890s. Russell took issue with that view, at least ostensibly. During World War I he played the part of pacifist. Russell argued that England could achieve the same goals without being drawn into a world war: It could be done by clever intelligence techniques—psychological warfare and manipulation. Thus began his career as a "pacifist."

2. The Uses of Peace

We move ahead now to November 1918. The terrible war is over, England saved by the last-minute military intervention of the United States. Much of Europe is in ruins. The total dead on all sides number 8.5 million. Casualties number 37 million (9 million Russians, 7 million Germans, 7 million from Austro-Hungary, 6 million French, 3 million from the British Empire, 2 million Italians). Famine and disease are everywhere. Influenza, typhus, cholera, diphtheria, and other scourges kill more people in the immediate post-war period than died in battle. The seeds of Hitler have already been sown in the unpayable burden of reparations imposed upon defeated Germany by the Treaty of Versailles.

The idea of peace makes sense to people. But how shall it be accomplished? Even as he wrote anti-German hate propaganda for the War Office, Wells had been working with a team of old cronies from the Coefficients Club on a new version of an old scheme: Subjugate the sovereignty of individual nations to a supra-national government, with its own army, navy, and air force, possessing a monopoly on modern weaponry. His first writing on the subject dates to 1916. In January 1919, as Chairman of the League of Free Nations Association, he publishes his call for world peace, titled "The Idea of a League of Nations."

The argument, as Wells describes it: Modern war is total war; the economic and human cost has become so great, it is intolerable. So long as the threat of war exists, nations must

4. *Experiments in Autobiography*, p. 653, cited in Carol White, et al., *The New Dark Ages Conspiracy* (New York: New Benjamin Franklin House, 1980).

expend an increasing portion of their wealth on the maintenance of armies, navies, and air services, and on scientific research to keep even with the potential enemy. Only outmoded thinking and prejudices, such as appeals to national patriotism, cause people to oppose his plan. If they would only think about it, they would see that the British Empire is already partially a world government:

> What is there in common between an Australian native, a London freethinker, a Bengali villager, a Uganda gentleman, a Rand negro, an Egyptian merchant, and a Singapore Chinaman, that they should all be capable of living as they do under one rule and one peace, and with a common collective policy, and yet be incapable of a slightly larger cooperation with a Frenchman, a New Englander, or a Russian?

The argument appears strikingly modern, only because the present-day world is organized around the continued attempt to implement this plan which originated in the needs of the British aristocracy a century ago. Yet, as Wells admits in his draft, it is not modern at all. It is an attempt to return to periods of weak nation-states such as the Middle Ages or the Roman Empire. It was only with the Italian Renaissance, Wells argues, that the idea of powerful nation-states threatened unity. Wells will attempt to destroy the nation-state in order to create a new world empire.

Moral Re-Armament: The Moon's Beginning

Wells's League of Nations proved a failure. The American people, among others, did not buy it, and the Senate could not be brought to ratify it. But the war for world empire, under the guise of "universal peace," had only just begun.

In 1921, an international arms-control conference took place in Washington, D.C., the first of a series known as the Washington Disarmament Conferences. Frank Buchman, by outward appearance an insignificant American Lutheran preacher, was invited to attend and given an audience with two Englishmen. One was Arthur James Balfour, head of the British Empire delegation and Lord President of the King's Privy Council, who would sign the treaty twice, once for the King and once for the Union of South Africa. The other was Balfour's longtime associate from the days of the Coefficients Club, H.G. Wells, who was attending the conference as reporter for an international array of press syndicates.

Out of this meeting within a meeting came the founding of an organization to be headed by Buchman, that came to be known as Moral Re-Armament (MRA). Moral Re-Armament was, and remains to this day, an influence-peddling and control operation, run as a pseudo-Christian religious cult, much like the later Moon cult which it spawned. In more ways than one, Frank Buchman was the Reverend Moon of the 1920s and 1930s.

Frank Buchman's Rise

Born in Pennsburg, Pennsylvania in 1878, Buchman graduated from Muhlenburg College, and later attended Pennsylvania State College. As a Lutheran minister in a poor part of Philadelphia, he came into contact with the American Friends Service Society. His entree into intelligence circles appears to have originated on a trip to England in 1908. There, in a small church, he claims he saw "a vision of the cross" which changed his life. Whatever else happened on that trip, Buchman on his return to the U.S.A., began moving in high circles, and was soon a friend of the national chairman of the Democratic Party.

In 1915, Buchman began a tour of the Far East, sponsored by the Young Men's Christian Association, one of many do-gooder organizations which serve as a cover for international intelligence operations. (The friendly YMCA had already been linked through the Moody Bible School in Chicago, to the 1881 assassination of President James Garfield, the Civil War general and Lincoln admirer who vowed in his inaugural address to enforce the Constitution against a racist reign of terror in the South.) The Buchman itinerary included India, Korea, Japan, and finally China. In Japan, he was personally greeted by Baron Mitsui, head of Japan's largest cartel, and hosted by Baron Shibusawa, founder of the Japanese Finance Ministry. Throughout his life, Buchman would maintain extremely close ties with the powerful Mitsui, Shibusawa, and Sumitomo families.

In 1917, Buchman arrived in China in the midst of a revolutionary epoch during which Sun Yat Sen had briefly held power. It was here, Buchman reports, that he perfected his method of influence-peddling and control. Buchman's technique was a shade more subtle than Moon's. Moon promises to satisfy his victim's craving for sexual satisfaction in the obvious way. Buchman wins the confidence of his victim, in order to control and manipulate his guilt. He called it his personal, "confessional approach" for "remaking man." He had already begun developing it while a graduate student at Penn State. Buchman put forth a public posture of moral probity and abstinence, inviting people to talk to him about their personal problems. Probing for the issues on which they felt the most guilt, he would persuade them that they could overcome their perceived weakness by confessing it to him, and becoming a faithful follower. Buchman won over many people with his technique, which became the trademark of Moral Re-Armament recruitment tactics, aimed generally at people of power and influence. Later, he also developed an ego-stripping technique, for mass recruitment in larger social settings.

In China, Buchman and his two friends drew up a list of 15 of the most influential Christians in Beijing. Sun Yat Sen was at the top of the list. He got as far as the Vice Minister of Justice, later acting Prime Minister, Hsu Ch'ien. Through Hsu, Buchman started a friendship with Sun. "If sin is the disease," he told an audience of missionaries, "we must deal with sin. Sin first of all in ourselves, the 'little sins' that rob us of power and keep us from being able to go out in deep sympathy to men in sin.' " But stories began to spread about Buchman's own pecadilloes, and he was forced to leave China. Still, Sherwood Eddy, the missionary who had brought Buchman to Asia, wrote: "Buchman's work in China has developed by a growth of evolution into a movement of immense proportions."

From China, Buchman made his way again to England. He arrived at Oxford in 1921-22, and began to work his magic on a circle of professors and students who were later to become

Library of Congress

H.G. Wells, in the late 1920s, at the time of publication of his The Open Conspiracy.

known as the Oxford Group. Most were veterans of the recent war, who gathered for philosophical debate. Buchman would attempt to steer them into discussions of their personal problems. Again scandal arose. There was talk of exhibitionism occurring at the meetings, and the ever-present suspicion of homosexuality, the bane of the British boarding school system. Buchman himself never married, saying that God had not chosen a partner for him.

His slogans, which became the "four pillars" of Moral Re-Armament, were: 1) Absolute honesty; 2) Absolute purity; 3) Absolute love; 4) Absolute unselfishness. Buchman's self-advertisement for his cause sounded convincing enough:

> Unless we deal with human nature thoroughly and drastically on a national scale, nations will follow their historic road to violence and destruction. You can plan a new world on paper, but you've got to build it out of people.

We shall see in a moment what he means by this.

3. The Open Conspiracy

Despite the scandals, the Oxford circle continued to grow. In 1928, Buchman, the posturing pseudo-Christian, received another boost from the avowed atheist H.G. Wells, with the publication of the first edition of Wells's *The Open Conspiracy: Blue Prints for a World Revolution.* The contradiction in theologies is only apparent. For both men, religion is a tool for power and social control. Through a study of Wells's *Open Conspiracy,* we can come to understand how a Gnostic sex cult such as Moon's, and a trained circus of pious peeping-toms such as Buchman's, may become instruments for achieving the same end.

Remember, the goal of Wells, Russell, and company is the destruction of the sovereign power of the nation-state, the United States above all, and with it the elimination of a philosophical, cultural, and religious tradition dating back more than 2,500 years. Remember, this is to be achieved not by the obvious methods but by subversion. It will be accomplished in a manner that shall leave the typical patriot almost completely blindsided. In opposing one side of the operation, he will find himself embracing the same thing, from another side. Until he troubles to actually understand the true nature of the enemy he is up against, his impotent flailings will be not unlike the attempt to wrestle with an invisible man.

What makes the "open conspiracy" open, is not the laying out of some secret masterplan, not the revealing of the membership roster of some inner sanctum of the rich and powerful, which the typical deluded populist supposes to be the secret to power in the world. It is, rather, the understanding that ideas, philosophy and culture, control history. What constitutes a conspiracy, for good or evil, is a set of ideas which embody a concept of what it is to be human, and a conception of man's role in universal history. This Russell and Wells understood, even if their definition of a human being, apparently based on close, personal observation, was a two-legged ape that babbles. Neither "Sancho Panza" Wells, nor the "Ingenious Hidalgo" Russell, whose pretensions to philosophy we shall shortly expose, are intellectual giants. The power of their evil lies only in their possession of this bit of knowledge and the social connections to propagate it. Follow them then, in your mind's eye, as we retrace their crooked path, which leads to the late 1960s unleashing of the Moonie scourge upon America, producing an effect similar to that achieved by the emptying of the world's largest loony-bin onto a university campus.

The New World Religion

The purpose of the Open Conspiracy, Wells tells us, with no evident shame, is the creation of a New World Religion. The first four chapters of the 1928 work present his "theological" analysis:

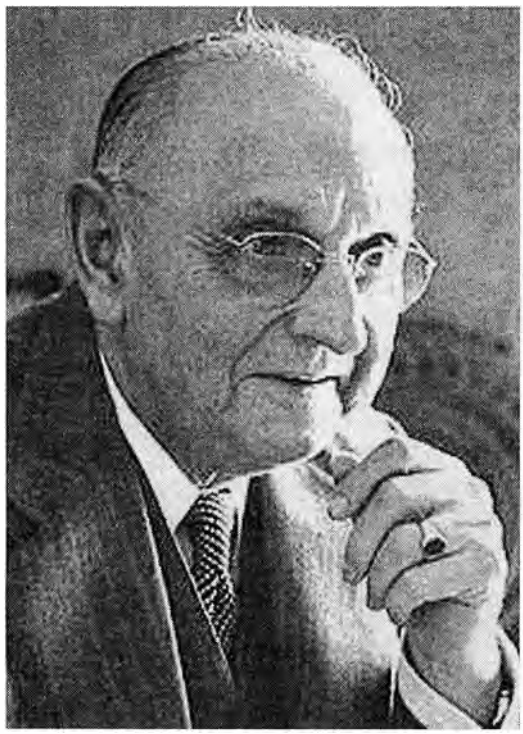
> The old faiths have become unconvincing, unsubstantial and insincere, and though there are clear intimations of a new faith in the world, it still awaits embodiment in formulae and organizations that will bring it into effective reaction upon human affairs as a whole.

In the second chapter, he argues that the essence of religion is the subordination of self. Though the majority may have difficulty keeping to the strict teachings, there is a minority for whom "The desire to give oneself to greater ends than the everyday life affords, and to give oneself freely, is clearly dominant." This is the emotion Wells and his friends hope to tap.

In the third chapter, "Need for a Restatement of Religion," Wells hints at his plan for writing a new Bible:

> Every great religion has explained itself in the form of a history and a cosmogony. It has been felt necessary to say *Why?* and *To What End?* Every religion has had necessarily to adopt the physical conceptions and usually also to assume many of the moral and social values current at the time of its foundation. . . . In these conditions lurked the seeds of an ultimate decay and supersession of every religion.

Later in *The Open Conspiracy,* Wells will refer to his threefold "modern Bible scheme." The first part (his replacement for *Genesis* and the books of the prophets) was his *The Outline of History,* published in 1920. Apparently Wells's Bible lacked an important one of the commandments. Modern scholarship has determined that Wells stole this multi-volume survey of the whole history of mankind (otherwise claimed to have been written in the extraordinary span of 18 months!) from a Canadian suffragist, Florence Deeks.[5]



Frank Buchman, the Nazi who founded Moral Re-Armament, the egg from which Moon hatched.

The second part of Wells's Bible, his cosmogony, was even then being written in collaboration with Julian Huxley and Wells's own son. Titled *The Science of Life,* it was published in 1930 in four volumes. As elaborated there, Wells's new religion is nothing but the Social Darwinism he learned at the feet of Thomas Huxley, a crude appeal to biological determinism. The reader is overcome with a mass of detail, all conceived to promote the social policy of eugenics and birth control for the engineering of a superrace. Every feature of modern ecologism is already contained in this work.

The third part of the Bible according to Wells, was to be the *Science of Work and Wealth,* his study of "economic and social organization considered as the problem of man's exploitation of extraneous energy for the service of the species." He never lived to complete it, or perhaps the targetted author gave up "the ghost" first, before his, or her, surplus energy could be exploited.

The Program of 'The Open Conspiracy'

In the fourth chapter, Wells comes to the nub of the matter. Service to an ideal, the desire for a better order, is the heart of religion. His plan is to find a way to direct this powerful emotion to the implementation of the program of the Open Conspiracy.

In a later chapter, he summarizes the program of *The Open Conspiracy* in three clear and simple points:

> Firstly, the entirely provisional nature of all existing governments, and the entirely provisional nature, therefore, of all loyalties associated therewith;
>
> Secondly, the supreme importance of population control in human biology and the possibility it affords us of a release from the pressure of the struggle for existence on ourselves; and
>
> Thirdly, the urgent necessity of protective resistance against the present traditional drift towards war.

There is no clearer statement of the program of that influential grouping which called itself, and came to be known as, the Utopians.

Buchman's Cue

The first and third points of Wells's program were to be the basis for the first mass organizing project of the Open Conspiracy. Frank Buchman's Oxford Group, the seed crystal for the Moral Re-Armament Movement which was to spawn the Moonies, would be the vehicle. Wells had spelled it out precisely in Chapter XII:

> The putting upon record of its members' reservation of themselves from any or all of the military obligations that may be thrust upon the country by military and diplomatic effort, might very conceivably be the first considerable overt act of Open Conspiracy groups. It would supply the practical incentive to bring many of them together in the first place. It would necessitate the creation of regional or national *ad hoc* committees for the establishment of a collective legal and political defensive for this dissent from current militant nationalism. It would bring the Open Conspiracy very early out of the province of discussion into the field of practical conflict.

But to promote a mass movement for peace after 1933, as

5. The manuscript of Deeks's work, *The Web of the World's Romance*, had been received at Macmillan publishers in Toronto at the same time that Wells claims to have begun work on his history, published a year and-a-half later by Macmillan, New York. When Miss Deeks received her rejected manuscript, after an eight-month wait, it was tattered and dog-eared. A year or so later, when Wells's *Outline of History* appeared, Miss Deeks noticed extraordinary similarities to her own work, even to the repeating of certain errors she had later corrected, and the use of passages she had taken (she feared, too liberally) from John Richard Green's *Short History.*

   Lawsuits brought in six different jurisdictions from Toronto to London were all to no avail against the powerful connections of Wells. Wells could not afford to admit his guilt. The fortune he made from this work established his financial security. See A.B. McKillop, *The Spinster and the Prophet: H.G. Wells, Florence Deeks, and the Case of the Plagiarized Text* (New York: Four Walls Eight Windows, 2002).

Hitler was mobilizing for war, with Russia the expected target, was not the job for the communist movement. Some new sort of formation would be required.

Buchman and his group of followers at Oxford had made a well-publicized trip to South Africa in the late 1920s, where their movement for peace was christened the Oxford Group. Senior university officials soon embraced the group. B.H. Streeter, the provost of Queen's College, Oxford, and a well-known New Testament scholar, made public his support for Buchman at a 1934 meeting in Oxford Town Hall:

> The reason that I have come tonight is to say publicly that I ought now to cease from an attitude of benevolent neutrality towards what I have come to believe is the most important religious movement today.

4. Nazis and Moonies

The Oxford Group spread its activities to other nations, becoming especially strong in Norway, Japan, the U.S.A.—and Hitler's Germany, where SS/Gestapo chief Heinrich Himmler was a member! Naturally the propaganda of the Moral Re-Armament Movement, which still exists to this day, attempts to play down the Nazi connection. But the very name Moral Re-Armament was announced by Buchman at a 1938 meeting at the Waldlust Hotel, outside the city of Freudenstadt in Germany's Black Forest. Buchman made numerous attempts to meet with Hitler. He was granted an official exploratory interview with Himmler, through whom Buchman hoped to get a date with Hitler, but it didn't work out. It appears that Himmler could not persuade his bureaucracy. In his biographical memoir, *I Paid Hitler,* Fritz Thyssen, the Catholic steel industrialist who broke with the Nazi Party after Kristallnacht and fled Germany, wrote that both Himmler and Deputy Reichsführer Rudolf Hess were members of Moral Re-Armament. Like Moon today, Buchman sought the big names.[6]

In 1937, the Oxford Group began a publication called *The Rising Tide,* which also happens to have been the name of the paper of the Freedom Leadership Foundation, the Moonie front group set up in 1969 as the U.S. branch of the Moon-founded International Federation for Victory over Communism. Buchman's magazine was called *New World News,* the same as one put out later by Moon. The Moral Re-Armament singing group was known as the Angels, the model for Moon's Little Angels children's ballet.

The Peace Pledge

The signing of the Oxford Group's Peace Pledge, which called for renouncing participation in any war (exactly as Wells had outlined), became a vehicle for spread of the Wellsian movement among students in the United States and elsewhere. The Peace Pledge Union, which initiated the pledge, had been set up in 1936 by Bertrand Russell and Aldous Huxley, before the two came to spread their evil in the United States, Russell to Chicago and Huxley to California. This peace movement for Hitler's war drive, reached a peak in 1938, when Moral Re-Armament held rallies of 15,000 in New York and 30,000 in Los Angeles. After the Nazi invasions of Poland and Czechoslovakia, the Peace Pledge became a memory.

In England, Buchman had had the support of many wealthy and prominent people reaching all the way to the future King,

Professor and Mrs. B.H. Streeter (left) arrive at a conference of the Oxford Group in 1937, when they were still openly supporting Hitler. The pious fraud Buchman is on the right.

6. The charge of Hess's membership in Buchman's cult is both credible and interesting. Long before he met Hitler, Hess was a member of satanist Aleister Crowley's Isis cult, known as the *Ordo Templi Orientes*, which crossed over into Crowley's satanic Order of the Golden Dawn, popular among students at Cambridge and Oxford. Born in Egypt, Hess bought an Egyptian sarcophagus for his burial, but proved too tall to fit in it; when he died, his legs had to be amputated and buried separately.

After the Munich putsch of 1923, Hess shared a jail cell with Hitler for nine months at the same time *Mein Kampf* was being written, by aid of frequent visits from its real author, Bertrand Russell's friend Karl Haushofer. Recall that *Mein Kampf* foresaw an alliance between Germany and England to fight the Russian peril. It is supposed that Hess helped Hitler, to a deeper understanding of the occult.

When Hess parachuted into Scotland in 1941, to seek a separate peace, he landed at the estate of the Duke of Hamilton, one of many former Nazis among the British aristocracy. Hess was representing a group of army officers and industrialists who wanted to save Germany from what they saw as sure defeat under Hitler. But Churchill would have none of it—he wanted Europe to bleed a good while longer. Hess was imprisoned in Britain for the remainder of the war.

Edward VIII. In 1935, a year before he assumed the crown, the Prince of Wales was a frequent associate of Buchman's, according to royal biographer Charles Higham. Edward's rule lasted only until 1938, when he was forced to resign, ostensibly over a scandal involving his marriage to an American divorcée. The real reason was his scandalous support for Adolf Hitler, at a time when England was about to go to war. Buchman also had the support of Dr. Gordon Cosmo Lang, the Archbishop of Canterbury, who had a weakness for seances and once formed a commission to investigate psychic phenomena. Among Dr. Buchman's other British admirers were Sir Samuel Hoare, Prime Minister Stanley Baldwin, the Earl of Clarendon, the Marquess of Salisbury, and the Earl of Cork and Orrery.

"I thank heaven for a man like Hitler," Frank Buchman said in August 1936. Here, the Führer reviews troops with SS chief and member of Buchman's Moral Re-Armament group, Heinrich Himmler, on Reich Party Day.

Prominent American supporters of Buchman included *Los Angeles Times* publisher Harry Chandlee, Hollywood movie magnate Louis Mayer of Metro Goldwyn Mayer, and David Dubinsky, president of the International Ladies Garment Workers Union.

As war became imminent, Buchman fell under public attack both in Britain and the U.S.A. A widely publicized statement he had made to an American newspaperman in August 1936 did not sit so well now. Buchman had said: "I thank heaven for a man like Adolf Hitler who built a front line of defence against the anti-Christ of communism." There were investigations in the House of Parliament and the U.S. Congress, centering on his demand for exempting his members from the military draft as a religious group. The Catholic Primate of England, Cardinal Hinsley, threatened excommunication to anyone who joined Buchman's cause. The Jewish War Veterans Association condemned his open anti-Semitism. The Episcopal paper, *The Witness,* exposed Buchmanism as "a trap for labor" among other things. Much of Buchman's operations were focused on Communist influence in the labor movement. To take some of the heat, the Reverend James W. Fifield, pastor of a Congregational Church in Los Angeles, stepped in as the front man for the U.S. operations of Moral Re-Armament.

Buchman's Post-War Comeback

After World War II, Moral Re-Armament re-emerged as a major player in the Cold War environment that dominated the period of reconstruction of Europe and Japan. As the resistance movements of Italy, France, Greece, and elsewhere had been dominated by Communist-run popular fronts, it was no small task to disarm them and attempt to isolate the Communist influence. Buchman's love affair with Hitler was so well-known, it had to be mentioned in Peter Howard's official propaganda biography of him, *Frank Buchman's Secret,* published in 1951. Nonetheless, the decision was made to go with him.

In 1946, a group of wealthy Swiss bought Buchman the 500-bed Caux Palace Hotel on a breathtaking site, 3,000 feet above Lake Geneva, which remains today the center of international activities for the group. In 1949, Moral Re-Armament held a major conference at the Caux Palace, renamed Mountain House. It was the sort of affair the Moonies still dream of. There were 27 cabinet ministers and 118 parliamentarians from 26 nations in attendance, as well as trade union chiefs from 35 countries. There was heavy stress on the anti-Communist, Christian labor movement. Ex-Communist labor leaders, among them a South Wales steel worker and a German miner, testified on their conversion to Buchmanism. A bipartisan delegation of U.S. Congressmen was flown in by military airplane. The biggest promoter of MRA in the Congress, Karl E. Mundt, the South Dakota Republican who won the Senate seat in 1948, couldn't make it, but sent a telegram of support.

During the Marshall Plan debates, one-third of the U.S. Congress saw the film "The Good Road," a movie version of the MRA's musical stage show. Gen. Lucius Clay gave the show special permission to tour in occupied Germany. The MRA targetted trade-union members in the Ruhr region, especially miners. On Buchman's birthday in 1952, he

received telegrams from Richard Nixon, Willy Brandt in Germany, NATO commander Gen. Hans Speidel, the chairman of the Democratic Socialist Party of Italy, and a member of the French Chamber of Deputies, among others. The penetration was so complete, that Buchman claimed such important post-war figures as German Chancellor Konrad Adenauer, Italian Premier Alcide De Gasperi, and French Foreign Minister Robert Schuman as signators on some of his operations.

Aside from the formula "Communism = the Anti-Christ," Buchman's preaching was centered on the family, the importance of mother, and the code phrase "the truths you learned at your mother's knee." Typical activities for members included acting in plays pushing the MRA ideology, voluntary labor squads, and Bible study. A frequent theme in the plays: A woman dressed entirely in red, known as Virtue, is portrayed as stirring up labor-management disputes, and is finally exposed as really being a "Red." Major centers of activity in the United States were The Club in Los Angeles, a retreat on Mackinac Island, Michigan, and one in Westchester County, New York.

Korean Orphans

The spread of Buchman's operations into Korea is suggestive of the sort of base which may have provided the first members for Moon's zombie cult. In the Nov. 3, 1952 issue of Moral Re-Armament's *MRA Information Service,* there appeared an article about an island off the Korean coast near the mouth of the Natkong River, called Jinoo Do. The MRA article references the visit to the island of "an agent of the Medway Plan Foundation, an organization devoted to human rehabilitation." The Medway Plan appears to refer to a town in England in which sociological studies, first run under the rubric of Charles Madge's Mass Observations, and later incorporated under the London Tavistock Institute, were carried out.[7] The Medway study took up the relationship of sexual morality and work, focussing on the relationship of preachers to their wives in the town of Medway.

Arriving on Jinoo Do, the Medway Plan representative found an island inhabited by Korean orphans and juvenile delinquents, placed there by the army in 1951. Under MRA supervision, the orphans had established a "democratic town" there, policed and governed by themselves, and based on Frank Buchman's precept that "human nature can be changed." Everywhere one could find the slogans of Moral Re-Armament: "Absolute Honesty," "Absolute Purity," "Absolute Unselfishness," "Absolute Love." These, incidentally, became the slogans adopted by Moon. Other slogans on this "Brave New World" in the Korean Straits read: "No Hatred—No Fear—No Greed," or "New Men—New Nations—New World," or "Jinoo Do—Principle of Citizen Life."

The CIA and Moral Re-Armament

In his 1989 book, *The Game Player: Confessions of the CIA's Original Political Operative,* top spook Miles Copeland brags of the intelligence agency's control over both Moral Re-Armament and L. Ron Hubbard's Scientology movement. Copeland reports that he served in the 1950s as head of an agency entity known as the Political Action Staff. Under this umbrella, his assistant, Bob Mandlestam, developed an operation called "OHP," or "occultism in high places," described by Copeland as "a theory of political activism based on an impressively detailed study of ways in which leaders of the world based their judgments on one form or another of divine guidance." One of Mandlestam's projects was to "plant astrologists on certain world leaders." Another was to deploy "mystics" in the Georgetown section of Washington, D.C., home to many government figures, who would use "voodoo magic," based on rites prescribed by the CIA itself, to manipulate Congressmen.

As part of OHP, Copeland and Mandlestam began to utilize the Moral Re-Armament movement, which "gave us useful secret channels right into the minds of leaders, not only in Africa and Asia but also in Europe." After this, Copeland writes:

> When Bob made similar arrangements with Scientology, . . . we were on our way to having a political action capability which would make the highly expensive, largely ineffective and largely overt "covert action" of Bill Casey's CIA seem trivial by comparison. "MRA will hit 'em high, and the Church of Scientology will hit 'em low!" Bob liked to boast, and he was right.

Shocking as Copeland's revelations may seem, they barely scratch the surface of the age-old practice of political manipulation by cults. We will take up that matter, below, in the discussion of Moon's theology.

Moral Re-Armament Today

Moral Re-Armament continued to have a strong presence in the U.S.A., especially among student layers, up into the 1960s founding of the anti-Vietnam War movement. Despite its anti-Communist, right-wing profile, Moral Re-Armament literature even found its way into the early anti-Vietnam War movement, in which Bertrand Russell played a guiding role. In the U.S.A., the campus-touring spokesman for the anti-war movement in the 1963-64 period was Russell Stetler, a Haverford College graduate student who had studied with Bertrand Russell in London, and returned as the representative of Russell's International War Crimes Tribunal.

MRA's Agenda for Reconciliation front group has been active in Lebanon, Kenya, Sudan, Somalia, Ethiopia, and elsewhere. It was behind the 1992 Clean Elections Campaign in Taiwan, a similar effort in Kenya, and one in Ghana in the May 2000 election. The Moral Re-Armament spinoff International Communications Forum held a big conference in Sarajevo, Bosnia in September-October 2000. Its U.S.

7. Charles Madge was a surrealist poet, who received British government funding, in the late 1930s, for a new type of sociology project he called "Mass Observations." The project came under direction of anthropologist Bronislaw Malinowski, and was later brought under the auspices of the London Tavistock Institute. Tavistock was founded in 1921 as a London clinic specializing in treatment of shell-shock victims from World War I. In World War II, the clinic became the core of the Psychiatric Division of the British Army under direction of Brig. John Rawlings Rees. After the war, many of the leading brainwashers were dispatched to the United States to work on the secret mind-control projects of the Pentagon and CIA, including the MK-Ultra project for the study of LSD and hallucinogens. One of the major projects was a historical review of cults as a means of social control.

headquarters are in Richmond, Virginia, where it runs an organization called Hope in the Cities. Its Gente que Avanza group, active in Latin America for more than 30 years, has trained 800 young people from 20 countries. Other fronts include Farmer's Dialogue, and a women's organization called Creators of Peace.

With the fall of the Berlin Wall in 1989, Moral Re-Armament launched a new front group, Foundations for Freedom, to penetrate into formerly Communist countries. In 2001, Moral Re-Armament changed it name to Initiatives of Change UK. It still holds international meetings at the Caux, Switzerland site, around the theme of reconciliation among the faiths. Tibetan Buddhism's Dalai Lama has attended twice, along with Jewish, Islamic, and Christian leaders. It continues to intervene on behalf of British grand strategy, using benign-sounding front groups to carry out devious political ends. The "role of the individual as an agent for change in an era of globalization," is a leading theme today.

5. Moonrise Over Asia

The rise of Moon's Unification Church, out of the networks of the Buchman Moral Re-Armament organization, took place in the immediate aftermath of the Korean War—in a nation still occupied by hundreds of thousands of U.S. troops, and governed by a dictatorship run from Washington. The oft-told tale that Moon was a creation of the Korean Central Intelligence Agency, and that the Moon penetration of America, beginning in the 1960s, was primarily a foreign intelligence penetration, is thus a half-truth—and a misleading one. Moon was up and down, a creation of the KCIA. But ask yourself: What was the controlling force behind the KCIA? Think before you answer, for the "obvious" here is also a trap. It was not "the CIA," as populist-minded Americans—and anti-Americans—conceive of it. Behind the popularly misused term, "the CIA," is something both more interesting, and yet less mysterious, than most conspirophiles imagine. If you truly wish to know dark secrets, seek out that historical-cultural cauldron in which the midnight potions of the Russell-Wells "No-Soul Gang" are brewed. Its intoxicating spells work every bit as potently in Asia as in the West, as we shall soon discover.

The Early Moon

Based on a 1997 profile by historian Anton Chaitkin and other sources, Moon's biography prior to becoming a mass cult leader, can be summarized thusly:

Yong Myung Mun (the name was later changed to fit a Gnostic doctrine) was born in northwestern Korea in 1920. His parents converted to a Pentecostal sect of the Presbyterian Church when he was about 10. Under North Korean Communist rule in 1946, Moon set up his own Pentecostal church, called the Jerusalem of the East (Kwang-ya). It featured shouting, faith-healing, and a Moon innovation called "blood-sharing." Based on pagan fertility rites, this was the unlimited copulation of the pastor with his female followers. On complaints from Christian churches, Moon was arrested by the North Korean police in 1946 for adultery, and again in 1948. He was tried on charges of bigamy and "social disorder," and condemned to five years of hard labor in a prison camp in Hung-nam. After serving two and a half years, he was released by advancing United Nations forces, and made his way south. He soon left his wife, and, without divorcing her, remarried and went back to holy blood-sharing.

Moon moved to Seoul, South Korea in 1954, where he set up the Holy Spirit Association for the Unification of World Christianity, or Unification Church. This occurred in connection with the founding of the Asian People's Anti-Communist League, an organization in the orbit of the Frank Buchman Moral Re-Armament grouping. Moon's lawyer at the time was Robert Amory, deputy director of the Central Intelligence Agency under Allen Dulles.

Moon was arrested by the Seoul police in July 1955 for indecent activities causing "social disorder." The newspaper *Segae* reported July 6, 1955 that dozens of upper-class and university women were sexually involved with Moon. He was arrested again, later in 1955 for his furious fornications. On Oct. 4, 1955, after intervention by intelligence agencies, Moon was absolved of all accusations and freed. There began his free and clear path to emergence as a world figure.[8]

Sasagawa and the Japan Connection

The first Unification Church missionary, Sang Ik-Choi, left Korea on June 16, 1958 to set up operations in Japan. Specialists investigating the origins and current funding channels of the Moon operation are consistently led to the Japanese right-wing figure Ryoichi Sasagawa (1899-1995). A brief digression into the Japan connection will help to clarify the whys and wherefores of the curious rise to prominence of the Reverend Moon's sex cult.

Sasagawa was a shipping magnate in 1930s Japan, associated with the Mitsui Group, the trade and banking cartel which had always been aligned with the British factional interest in Japan. Declared a Class A war criminal (he had been an ardent fascist and regular visitor to Hitler's Germany), Sasagawa, at first, had to keep a low profile during the U.S. occupation. But his post-war fortune was rebuilt with help of Gen. William H. Draper, Jr., the anti-population-growth fanatic who founded the Draper Fund for Population Control and spent a time in occupied Japan as Undersecretary of the U.S. Army. Later, Sasagawa became honorary chairman of the Draper Fund, and was also a co-founder of the Malthusian Club of Rome with Alexander King and Aurelio Peccei. Sasagawa provided much of the official funding for the Asian People's Anti-Communist League, set up June 15-18, 1954, in Chinhae, South Korea. This then crossed over into Buchman's Moral Re-Armament networks, and later became a central part of the Moon operation.

In the late 1960s, just before his move to America, the Reverend Moon made an arrangement with Yoshio Kodama, the post-war leader of the 3-million-strong Japan Youth Federation, which formed a cornerstone of the World Anti-Communist League (WACL). Kodama had worked very closely with Sasagawa during the 1960s and 1970s. After the

8. Cf. Anton Chaitkin, "The Mob That Moon Really Married," EIR, Dec. 12, 1997.

meeting, Kodama's lieutenant, Osami Kuboki, became Moon's chief executive for Japan, and the head of the Unification Church there. After Kodama's death in the 1980s, Moon gained increasing influence over the Japan Youth Federation.

But Kodama was also a silent partner in Japan's organized-crime ring known as the Inagaki-kai *yakuza.* (The *yakuza,* Japan's mafia gangs, are the laundry for billions of dollars in Asian drug trade cash.) One of Kodama's chief aides was arrested in Hawaii in 1991 for transporting cocaine under cover of the trading activity of the Sagawa Kyubin trucking company. The firm was run by Susumu Ishii, a founder and leader of the *yakuza,* until his November 1991 death. Reverend Moon's funder, Yoshio Kodama, was an investor in Ishii's trucking firm. The *yakuza's* dirty drug money is suspected of being the main source for the suitcases full of cash which Moon's members transport regularly into the United States to fund his enormous influence-peddling and corruption operations. The cash and gold watches, which American ministers and Congressmen routinely accept from Moon, are thus, presumably, paid for by the profits of the Asian drug trade. One might consider that, the next time a parishioner's child dies of a drug overdose.

Papa Bush's Cash Cow

The same sources helped pay for the election of current President George W. Bush. In September 1995, when he was seeking money to fund his son's political career, former President George H.W. Bush went on a speaking tour of Japan for the Women's Federation for World Peace, headed by Moon's wife, Hak-ja Han-Moon. After a Sept. 14 address by Mrs. Moon in the Tokyo Dome, former First Lady Barbara Bush declared Mrs. Moon "my sister," according to a small item that appeared the next day in the Moonies' *Washington Times.* In November 1996, the cash-hungry father Bush toured Argentina, Peru, Uruguay, and Venezuela with Reverend Moon, on a mission to launch a Spanish-language version of the *Washington Times* for distribution in South America, known as *Tiempos del Mundo.*

But the Bush family ties to Moon operations preceded all that. According to Japanese intelligence sources, Prescott Bush II ran Asian secret operations for his brother, the first President George Bush. Prescott was an adviser to the just-mentioned Sagawa Kyubin trucking firm involved in the cocaine scandal, and owned by the Moon-connected gangsters Ishii and Kodama. Prescott was also tied in to other Ishii businesses. From 1989 to 1991, he served as a $250,000-a-year consultant to Ishii's Hokusho Sangyo Co., according to U.S. Securities and Exchange Commission reports.

How Japan Became America's Enemy . . .

The Japanese connection to the rise of the Moon cult is important for another reason. The presence of the Mitsui group at the center of the Moon and Buchman operations in Japan is a marker for something even more central to understanding the forces behind the Russell-Wells "no-soul gang." Again a step back in history, will make the matter clearer.

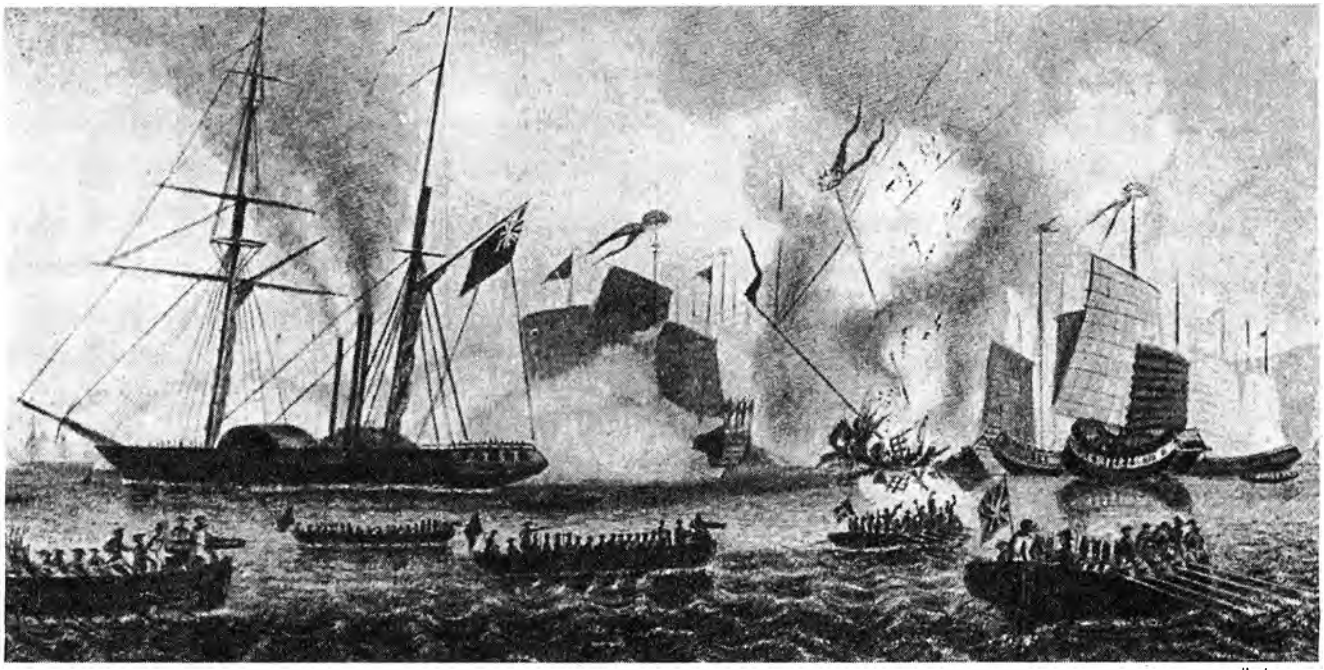
When former President Ulysses Grant visited Japan in 1879,

Lincoln National Life Foundation

In 1879, former President Ulysses S. Grant warned Japan's Meiji government to beware of British treachery. Grant is pictured here as General of the Army in the Civil War.

at the conclusion of a three-year world tour, he warned the Meiji government against the treachery of the British. Great Britain was then the open enemy of patriotic Americans, and the battle between the American and the British systems the central struggle in the world. How Japan responded to this struggle would be crucial for its future. The fate of China had already been determined a few decades earlier, at a time when America was divided and weaker.

Through two Opium Wars, Britain had subjugated and humiliated China. The first Opium War began in 1839, when China banned the importation of British opium, shipped in from the Indian colony. The British intent was to create the world's largest free market in drugs by addicting the huge population of China's coastal cities. China was no match for British naval power. By the Treaty of Nanking in 1842, she was forced to surrender the ports of Canton, Shanghai, Amoy, Foochow, and Ningpo to British trade, and to cede the island city of Hong Kong entirely to Britain. But worse, China was forced to yield up her population to the scourge of the opium den. The second Opium War from 1856-1858, joined in by



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East India Company steamer Nemesis *and smaller British craft demolish Chinese junks in 1841 battle of the Opium War, fought to force China to open her ports to British-grown opium*

British and French troops, ended in the Treaty of Tientsin, which forced the opening of ports from the mouth of the Yangtze River north to Manchuria.

In Japan, a pro-American faction developed, which learned the difference between the British and American systems. In 1853, between the two Opium Wars, a Japan previously closed to all foreign contact received U.S. Navy Commodore Matthew Perry, and a treaty of friendship was soon worked out. A circle of reformers grouped around the intellectual leader Yukichi Fukuzawa founded newspapers and a university to educate Japanese political layers to an understanding of the uniqueness of the United States, and argue that Japan adopt America's revolutionary system as a model.[9]

The Meiji Restoration of 1868 overthrew the warlord-feudalist Shogunate, and returned full power to the Emperor, who was under the guidance of a faction of pro-American reformers, steeped in the writings of Alexander Hamilton and the U.S. Constitution. American System economist Erasmus Peshine Smith, the student of Lincoln's ally and economic adviser Henry Charles Carey, was dispatched to Japan by President Grant in 1871 to help guide the economic development program.[10] After the crushing of the Satsuma rebellion in 1877, pro-American reform groups were able to abolish feudalism, nationalize land held by warrior clans, and begin large-scale industrial development.

. . . And How America Became Its Own Enemy

Similar processes were under way in Germany, under the leadership of American System economist Friedrich List, and in Russia with the help of such figures as the great chemist Dmitri Mendeleyev, the author of a plan for industrialization of Russia by railroad development, and the Count Sergei Witte who was allied with the Meiji group in Japan.

The promotion of the American System of economy, and the concept of a government constituted to promote the general welfare—two ideas virtually banned from American history books in the second half of the 20th Century, remained the central aim of Republican administrations, up through the British-sponsored assassination of a newly re-elected President William McKinley in 1901. (That Republican Party, as distinguished from the thing bearing that name today, was the party of Lincoln. The Democratic Party of the time, and continuing up until the breakthrough 1932 campaign of Franklin Delano Roosevelt, was the party of slavery and shareholder values, as it has tended to become again, since the disastrous Presidency of Zbigniew Brzezinski's puppet, Jimmy Carter, and the recent

9. "America is our Father," wrote Fukuzawa in Japan's first newspaper *Jiji Shinpo*, which he founded. "I regard the human being as the most sacred and responsible of all orders, unable therefore, in reason, to do anything base. So in self-respect, a man cannot change his sense of humanity, his loyalty, or anything belonging to his man-hood, even when driven by circumstances to do so," Fukuzawa wrote. Another leader of the Meiji group, Shigenobu Okuma, wrote in his study *Fifty Years of the New Japan* that without the "U.S.A. as chaperone," Japan might be just another colonial satrapy. (Kathy Wolfe, "Hamilton's Ghost Haunts Washington from Tokyo," EIR, Jan. 3, 1992.)

10. While American students are now taught the treasonous falsehood that British East India Company employee Adam Smith was the founder of their economic system, Japanese students still learn of the real American System, and study the works of Alexander Hamilton, E. Peshine Smith, Friedrich List, and others. The relative strength of Japanese industrial-productive capability (up through the recent onset of a depression caused by acquiescence to globalist, monetarist demands), as compared to America's long-dead productive economy, derived from Japan's continued emphasis on the American System in its economics and industrial engineering training.

hegemony of the Democratic Leadership Council.)

The secret to what happened to the intellectual tradition that produced the American Revolution, Lincoln, and the post-Civil War industrialization, is summed up in this historical fact. In the last quarter of the 19th Century, America's principal allies were Germany, Japan, and Russia—the very same nations which became her principal enemies in the 20th Century. Worse yet, America became its own enemy, betraying its own history by a still-raging case of collective historical amnesia. There was no irony in it. That was precisely the result which the grandson of Palmerston ally Lord John Russell, and his lower-class sidekick, Wells, had intended.[11]

Buchman Again

The Japanese family cartels which tended toward a pro-British stance from an early point, were Mitsui, Sumitomo, and Shibusawa. The Mitsui banking and trading company complex had been the leading Japanese partner of Jardine Matheson and Company, the Scottish shipping firm which controlled the largest share of the British Empire monopoly in opium. Moral Re-Armament founder Frank Buchman met the Barons Mitsui and Shibusawa (then the Finance Minister) in 1915, when he travelled to Japan on his YMCA-sponsored Asian tour. Later, Buchman came to know intimately Kichizaemon Sumitomo of the Sumitomo cartel, and the entire Shibusawa banking family.

The Baron Mitsui's second son, Takasumi, came to study in England, first at Halford Mackinder's London School of Economics, and later at Magdalen College, Oxford. In 1935, Prof. B.H. Streeter, the Moral Re-Armament leader and provost of Queens College, Oxford, invited young Takasumi Mitsui to meet with Buchman. Buchman attempted to use Takasumi for a three-pronged penetration: to push for Anglo-Japanese rapprochement; to intervene into the conflict in China; and, to "bring Japan into a united front with Britain and the Axis powers for a crusade against Bolshevism," in Buchman's words.

It was exactly the geopolitical program which Haushofer had dictated to Hitler as he composed *Mein Kampf*. No surprise that it should coincide with the program at Oxford, since Haushofer acknowledged he had taken his geopolitical analysis—that whoever controlled the "Eurasian heartland" (Germany, Central Europe, and Russia) controlled the world—from the Coefficients' Halford Mackinder. Buchman and the Oxford Group were hardly alone in their efforts. In 1935, before Hitler turned westward, the policy of bleeding "the heartland," by engineering a confrontation between Hitler and the Soviet Union, was the prevailing policy among the British elite.

Takasumi was induced to return to Japan. "Sumi must become a peacemaker," the pious fraud Buchman intoned. The young Mitsui reached Japan in 1939, where he gave several lectures on Moral Re-Armament before businessmen's clubs, and to a captive audience of Mitsui executives. But the pro-Axis militarists who held the reins of power did not want to hear of collaboration with the British at this late date. His high connections allowed him to escape punishment by the militarists, and Takasumi was permitted to establish a school in Tokyo during the war. Despite his pro-Hitler sentiments, he was also spared punishment during the American occupation, and by 1947 had become the leader of the now widely accepted Japanese branch of Moral Re-Armament.

6. Transformation in Korea

The Korean War provided the venue for the next phase of implementation of the Russell-Wells scenario. The penetration by U.S. military and intelligence circles by that point, was the key to the operation used to create Moon. In the middle 1950s, U.S. military intelligence and the Allen Dulles-controlled CIA operations crowd were all over Korea, training and recruiting assets, and monitoring all political, social, and religious activity under the Syngman Rhee dictatorship. According to former U.S. Air Force Intelligence officer Col. Fletcher Prouty, the securely controlled environment and huge military presence made South Korea an ideal base for the "Secret Team" operations of the notorious Gen. Edward Lansdale, which ranged throughout Asia.

One key reminder of the bigger picture is necessary, before turning to the details of the recruitment and transformation of the sex deviant, who now imagines himself the Messiah.

The war in Korea had marked a decisive advance for the British Utopian influence over the United States, in many ways. President Truman's 1951 firing of Gen. Douglas MacArthur, who would not accept the "limited war" concept central to the Russell-Wells doctrine, was a marker for the growing influence of the Utopian faction in the U.S. military. After World War II, traditionalist military men had fought against the development of a Central Intelligence Agency separate from the military branch intelligence services, and lost. As the Utopians gained control, the military intelligence services as well were penetrated and corrupted into instruments of Utopian policy.

After 1945, the whole military-strategic environment was shaped by the bomb. The unnecessary dropping of the only two fission weapons in the U.S. arsenal on a Japan that was already negotiating a surrender, was the greatest triumph of the Russell-Wells faction. Just as Wells had called for in *The Open Conspiracy,* the demonstrated existence of a weapon too terrible to contemplate, opened the way to soliciting nations to surrender sovereignty to a world entity. Bertrand Russell's role, from his post-war call for a pre-emptive strike against the Soviet Union, to his position in brokering relations between Kennedy and Khrushchov in the Cuban missile crisis, was central. One cannot properly make sense of any significant development in the post-war world without grasping the central influence of that Russell-Wells Utopian doctrine in shaping them.[12]

The Rise of the Sex Deviant

For obvious reasons, every detail of Moon's turning and recruitment by Western intelligence services cannot be

11. England succeeded in pulling Japan behind her in the First World War. The United States entry on behalf of England meant postponing the U.S.-Japanese military confrontation sought by the British. But the two principal military defense plans of the United States in the 1920s and into the 1930s were War Plan Red and War Plan Orange. The first was for the contingency of a British attack; the second, in case of a Japanese attack.

12. See, Lyndon H. LaRouche, Jr., "How Bertrand Russell Became an Evil Man: Reflections Upon Tragedy and Hope," *Fidelio,* Fall 1994, for a precisely focused historical-philosophical treatment. This was LaRouche's first major work, after emerging from a five-year imprisonment arranged by friends of Henry Kissinger.

known. His 1955 imprisonment on sex offenses was likely the scene for the recruitment effort by American-trained Korean intelligence operatives. Some time after Moon's jailing, four Korean military officers with U.S. intelligence training joined the Moon cult. The four were later to become operatives of U.S. intelligence asset Maj. Kim Jong Pil, the founder of the KCIA and the man who installed the Park Chung Hee regime in a 1961 coup.

These four early Moonies were:

- Kam Jan In (a.k.a. Steve Kim), who served as Kim's interpreter and later became KCIA station chief in Mexico City, where sources report he was instrumental in establishing connections between Moon and the drug cartels;
- Hang Sang Keuk, later Korean ambassador to Norway, where he served as liaison for the Moon organization to the Captive Nations organizations of Communist East Europe;
- Hang Sang Kil, who became Moon's personal secretary after serving as liaison with the U.S. Department of the Defense at Korea's Embassy in Washington; and
- Col. Bo Hi Pak, who still runs Moon's U.S. operation, and was originally the link between the Korean Embassy and the U.S. National Security Agency, according to Robert Boettcher's *Gifts of Deceit.*

Moon was absolved of all charges, and released from his South Korean jail cell on Oct. 4, 1955. A few days later, his Unification Church acquired a Buddhist temple at Chong-Padong in Seoul, which became its headquarters. By the end of 1955 there were 30 Unification Church centers throughout South Korea, spreading Moon's Gnostic gospel. Even so, the scandals did not subside. *Segae* in 1957 alleged Moon to have had orgies with 70 students.

One of Moon's early disciples, Chung Hwa Pak, broke with him, and made public charges that Moon practiced his sex rituals with, among others, six married female disciples. Moon claimed that these women were preparing the way for the virgin, who would marry him and become the True Mother. The charges were made public in the widely circulated text *The Tragedy of the Six Marys,* later published in Japanese. Chung Hwa Pak later returned to Moon's payroll, and recanted his accusations.

KCIA chief Maj. Kim Jong Pil reportedly relied heavily on two important sources to fund KCIA covert operations: first, Japan's Class A War criminal, Ryoichi Sasagawa; second, Israeli slimeball Shaul Eisenberg. Eisenberg, who is at the center of more politically tainted shady business dealings than one can shake a judge's gavel at, brokered deals with the Japanese for the KCIA's Kim; he may also have been the go-between in establishing Walker Casino and resort near Seoul in 1962, which provided a money-laundering capability for covert operations.

Many of these facts come up in exposés, such as Boettcher's, and in the 1978 Fraser Committee hearings before Congress. The common error is in implying primary intent to the KCIA or even to the interests of the Moon cult itself. As we have seen, the mother lies elsewhere.

7. The Moon Lands on America

The unleashing of the Reverend Moon's Gnostic sex-cult freak show onto the streets of 1970s America only appears odd or inexplicable, if one chooses (as in deference to academic and media-approved opinions of modern history) to block out the openly stated aims of those who set up the cult in the first place: to destroy, by subversion, the unique experiment which was the American Revolution, and the intellectual tradition which produced it. Once that elementary point is grasped, all that need be explained is the changeover in tactics which took place in the 1960s.

This new phase of the Moon marked the promotion of mass insanity. Moon's missionaries came to the U.S.A. in the early to mid-1960s. Sang Ik-Choi, the first missionary to Japan, went to the U.S.A. with Yun Soo Lim, called Onni (Korean for "elder sister"). Onni was later "blessed" by Moon in a marriage to Dr. Mose Durst, whom she had converted. Together, they took charge of the Oakland Family in California, which became the most important center of Unification Church proselytism. In February 1972, with about 500 American members, Moon proposed at a Los Angeles meeting, the launching of an expanded recruitment drive based on forming mobile "witnessing teams" to tour the United States. This was the One World Crusade. Huge sums of money flowed in to set up permanent Unification Church centers in all 48 states, and to purchase a compound in Tarrytown, New York, on a property previously owned by the Bronfman family, of liquor and drug-money-laundering fame. (Rank-and-file Moonies were led to believe that their slave labor in producing wax candles, and street-corner sales of flowers and magazines actually paid for all this.) The Belvedere compound in Tarrytown became Moon's first home, when he relocated to the U.S.A. in 1972.

The One World Crusade was carried out with all-night, group brainwashing sessions, involving sleep- and food-deprivation, and use of psychedelic stimulants. After one notorious recruitment session at the New Yorker Hotel, bodies were found at the foot of the elevator shaft. This was the mad phase of the Moonie assault on America, the reason behind that all-too-familiar empty smile and vacant stare, worn by Moon's clean-cut, young street-corner zombies.

Why? *Cui bono?*

The Strategic Shift

The key to understanding the motivation behind this launching of mass insanity, is to recognize the important shift in the global strategic picture which had been achieved through Soviet General Secretary Khrushchov's assent to the 1963 test-ban and arms limitations agreements. For the Russell-Wells Utopians, this meant that the high rate of Western investment in scientific and technological progress, which had been required by the furious pace of the earlier arms race, could be slowed, without fear of losing everything. That had been the intent behind the U.S.-Soviet disarmament talks, initiated by the Russell-Szilard Pugwash movement in 1955. By the time of the assassination of President John F. Kennedy, an essential part of that objective had been achieved.

The evolution of the Moonies into a mass cult in the late-1960s U.S.A., had been preceded by establishment of a wide range of business and influence-peddling fronts. Moon's U.S. operations

EIRNS

Posters for a 1976 Moonie rally in New York. The concept for Moon's One World Crusade was born in London, a century ago.

began to really take off with the 1964 founding of the Korean Cultural and Freedom Foundation, by Col. Bo Hi Pak. (Moon's KCIA controller had incorporated a U.S. Unification Church earlier, but it had only proto-cells and a tiny following.) A year later, Bo Hi Pak launched the Radio Free Asia project, a transparent scam to build the coffers of the Unification Church. With backing of factions in the U.S. intelligence community, Radio Free Asia solicited millions from American anti-Communists to operate a transmitter in Korea, already paid for by the Korean government. One after another, the business and political front groups were established by figures including Col. Bo Hi Pak; Neil Salonen, Moon's first high-level American operative; and others, until the listing reached 33 single-spaced pages.

Once the decision was made to deploy the mass-scale recruitment operation onto U.S. campuses, other networks of the Russell-Wells no-soul gang lent a hand. Some of the early psychological conditioning of the Moon cultists was carried out by the Michigan-based National Training Laboratories. This was the social-engineering operation, specializing in labor relations, run under direction of the Tavistock Institute-trained Kurt Lewin and University of Pennsylvania Prof. Eric Trist.

Vietnam

Just as the Utopian-managed war in Korea had provided the context for the Moon recruitment, so the Vietnam War, the next of the succession of managed conflicts (held below the threshold of total war by pre-agreement among the superpowers), provided the human fodder for the Moonie recruitment in America. Most of the American Moonies were recruited out of the rock-drug-sex counterculture, deliberately introduced into the student ferment against the Vietnam War. Allen Tate Wood, for example, the prominent Moonie defector (who happens to be the grandson of the Southern Fugitives School poet Allen Tate), was a leader in the anti-war demonstrations which culminated in the burning of the Reserve Officers Training Corps (ROTC) building at the University of the South in Sewanee, Tennessee. Within a year or two, Tate Wood was lobbying Congress on behalf of continuing the war in Southeast Asia, a principal activity for Moon's zombies, working under cover of the Freedom Leadership Foundation front in the early 1970s.

While the zombies were hawking candles and roses on the streets, Moon's Freedom Leadership Foundation had set up meetings for the sex deviant with an impressive list of U.S. Senators and Congressmen. Between February and April 1973, Moon held meetings of half an hour or longer with:

Senators William Brock (R.-Tenn.), James Buckley (Cons.-N.Y.), Jesse Helms (R.-N.C.), Hubert Humphrey (D.-Minn.), Edward Kennedy (D.-Mass.), and Strom Thurmond (R.-S.C.); and

Representatives Philip Crane (R.-Ill.), Richard Ichord (D.-Mo.), Guy Vander Jagt (R.-Mich.), Earl Landgrebe (R.-Ind.), Trent Lott (R.-Miss.), William Mailliard (R.-Calif.), and Floyd Spence (R.-S.C.).

Reverend Moon addresses his goggle-eyed followers at the Barrytown, New York training center, about 1973. This was the second Westchester County estate acquired by the cult. The first one came from the Bronfman family.

The most evil aspect of it all was the intentional elimination of the rational, scientific mental outlook associated with a modern, technology-based, agro-industrial economy. Moon was not the whole of it. From 1968 on, every piece of the disparate networks of the Open Conspiracy was let loose at once. Of special note was the kookery of the Aldous Huxley/Gregory Bateson operation which had been brewing in California since Huxley's 1937 deployment to the United States. This was the origin of the drug side of the 1960s counterculture. To a youth culture terrified by the nightly news images of their peers returning home in body bags from a purposeless war, retreat into mind-altering drugs, mind-altering music, and even the mindlessness of Moon was not so strange. Another crucial piece of the operation had been hatched in New York's Institute for Social Research, which housed the emigré networks of Hungarian psycho Georg Lukacs's Frankfurt School disciples. Russell's Unity of the Sciences movement formed another piece. And there were more.[13]

13. See, Jeffrey Steinberg, "From Cybernetics to Littleton: Techniques of Mind Control," EIR, May 5, 2000, for a shocking report of the premeditated brainwashing of America carried out by the disciples of Wells, Russell, Huxley, et al.

The Bosch Canvas

Imagine America of the late 1960s into the 1970s, as if it were the panoramic background to a painting by Hieronymus Bosch. Think of the canvas as a whole, with its nightmarish imagery of degeneration and debauchery, and the events as they actually occurred:

- the launching of the rock-drug-sex counterculture, under direction of such of Aldous Huxley's MK-ultra program disciples as Harvard's notorious psychedelic drug pushers, Richard Alpert and Timothy Leary; and, the parallel operation of stupefaction of popular music, as prescribed in the studies of Frankfurt School musicologist Theodor Adorno;
- the spread of the mass environmentalist movement, funded under such auspices as the World Wildlife Fund of Britain's royal consort, Prince Philip, and the card-carrying Nazi, Prince Bernhard of the Netherlands; the parallel deployment of a mass movement for world depopulation as in the promotion of the genocidal doctrines of the Club of Rome, founded by Moon collaborators Alexander King, Aurelio Peccei, and Japan's Class A war criminal Ryoichi Sasagawa;
- the dumbing down of U.S. education, especially de-emphasizing serious study of the sciences and Western Classics, as prescribed in the Rappaport report produced during Alexander King's reign at NATO's Organization for Economic Cooperation and Development;
- the destruction of the principal technology driver of the 1960s U.S. economy, the Wernher von Braun-conceived Moon-Mars colonization program;
- the dismantling of U.S. industrial capability, including its conventional nuclear power capability, and the eventual shutdown of the controlled thermonuclear fusion effort—all as prescribed in the *Project 1980s* report of the New York Council on Foreign Relations, under the heading "controlled disintegration of the U.S. economy"; and so forth.

By such means, the scientifically vectored, production-based world economy of the 1945-64 period was brought to its present state of onrushing depression collapse.

A Paradox

In *The Time Machine,* Wells's 1895 vision of the British oligarchy's utopia, the working classes have evolved (Huxley-style) into hairy, muscular, ground-hugging creatures, known as Morlochs, who do the work of production for society in underground mills. The upper classes, known as the Eloi, live their effete, airy existence on the surface above, while also serving occasionally as fresh meat for hunting parties of escaped Morlochs. To bring Wells's

degraded vision up to date, merely substitute for the Morlochs' underground foundries, the exported manufacturing industries of the Third World sweatshops and *maquiladoras;* instead of the Eloi, think of the credit-card based consumer society at the top of which sit the now-shrinking number of idle rich in the advanced-sector nations. There, in summary, is a fair approximation of what the anti-American assault of the 1960s rock-drug-sex counterculture produced.

The rational person of good will, observing what can only be comprehended as an outbreak of mass insanity among his fellow citizens, asks himself: How is such a thing possible? The thought occurs to him that some person, or persons, must have brought about this state of affairs wilfully. For what reason, he asks, and how could such a thing be contemplated by rational men? Thus arises a paradox. Can collective madness be reasonably planned? We refer the still perplexed reader to the quotation at the opening of this article.

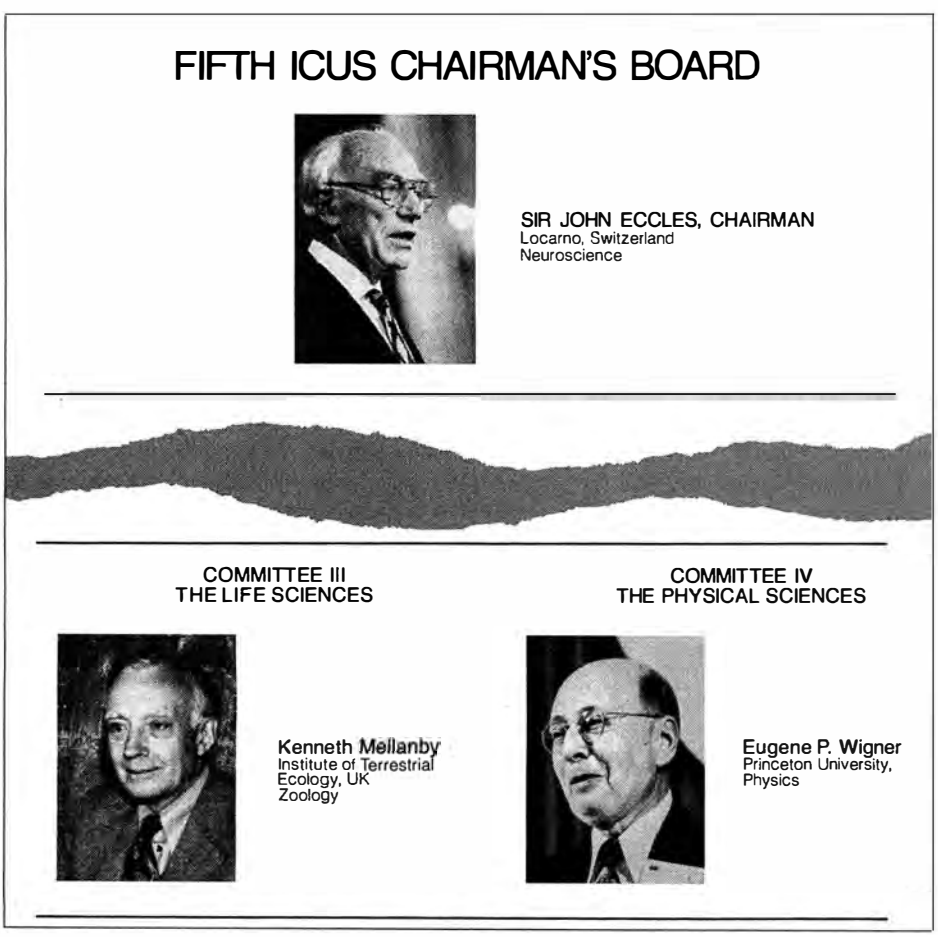
Now, summon this whole fantastic Bosch canvas before your mind's eye, as you think on today's purchased preachers, Presidents, and Congressmen, some so bold as to brag openly of the Moonie-supplied gold watches decorating their wrists. Yet, do not forget the even more widespread fear and corruption of a free citizenry, which has *chosen* to place Moon's purchased merchandise into positions of power and responsibility, and even now tolerates their continuance. Thus, look pure evil in the eye, and know, even so, that it can be defeated, provided you will fight.

8. The Moonification of the Sciences

In 1972, several busloads of members of Moon's "Oakland Family" rolled out of their Berkeley Center, with the intention of turning their cult of a few hundred adherents into a national movement. As the candle sellers hit the streets, others rented halls, printed programs, and sold tickets for the multi-city speaking tours of their "Father" Moon. Meanwhile, behind the scenes, the Russell-Wells "no-soul gang" was already working on the next big step of the Moonification of America: They would merge the cult of the Korean sex-deviant, with the networks of corrupted scientists already gathered around Bertrand Russell's Unity of Sciences movement.

The first International Conference of the Unity of Sciences (ICUS) took place at New York's Waldorf-Astoria Hotel, Thanksgiving Day, 1972. There were 20 academics from 8 nations sharing the platform with Reverend Moon. Among them: Harvard's Russellite professor of philosophy, Willard V.O. Quine, and systems specialist Ervin Laszlo of the genocidal Club of Rome.

From small beginnings, the subsequent ICUS conferences grew to hundreds, and then thousands. These would become the annual Walpurgis Night celebrations for the ghouls and goblins of the "no-soul" gang's science establishment, many of them proudly bearing the mark of that discredited Nobel Prize committee, which had long since become an instrument of the Russell-Wells conspiracy. Cash and entertainment was provided by Moon, the Mephistopheles of Poontang himself, who would also deliver a personal statement of greetings to each conference.



From the program of the 5th International Conference on the Unity of the Sciences, Washington, D.C., Nov. 26-28, 1976.

Eugenics and the Super Robot

Moon's third Unity of Sciences conference, in 1974, took place at the Royal Lancaster Hotel in London. The Chancellor of Cambridge University, Edgar Douglas Lord Adrian, presided. Lord Adrian was a Nobel Laureate, and aging leader of the eugenics movement (as Wellsian biology had been called before the Nazi crimes gave the term a bad name). His researches on the passage of nerve impulses across the synapse marked the early phase of what was to become the Open Conspiracy's two-pronged

Library of Congress

Physicist-turned-biologist Leo Szilard met with H.G. Wells in 1931, and vowed to become his disciple. Dr. "Strangelove" Szilard, who saw the atomic bomb as the means to force world government, is pictured here testifying before a joint committee of the U.S. Congress in 1945.

program for science: to modify man, and create the superrobot "thinking machine."[14]

The fourth Unity of Sciences conference, back in New York, was keynoted by Sir John Eccles. Eccles had learned his neuroscience from Lord Adrian's partner Charles Sherrington (the two shared the 1932 Nobel Prize for physiology). Eccles then shared the 1963 Nobel Prize for physiology with Andrew Huxley, the third generation from the Thomas Huxley who had described the relationship of mind to body, as that of a bell to an alarm clock.[15] Eccles and the younger Huxley attempted to establish old Huxley's thesis, by researching the chemical basis of the action potential of the nerve impulse.

The Huxley view of the brain became the central topic at the 1976 conference, in Washington, D.C., where prominent neuroscientists joined Eccles, that year's conference chairman, to debate the brain-mind problem: Which way to establish Huxley's hoax that the mind is merely a machine?

Some argued for a physiological approach: "The problems of higher brain functions are very much involved in the question of the unity of the sciences, if the ultimate aim is that the brain should understand the brain," Dr. H. Hyden, Director of the Institute of Neurobiology at the University of Göteborg, said. Others called for a mathematical model: "What is needed is *not* a detailed understanding of the physiology of the brain, but a form of statistical mechanics that prescribes the properties of a mechanism capable of assimilating information from outside itself and performing logical transformation to that information before generating motor output," argued Dr. J.W.S. Pringle from Merton College, Oxford.

Also at the fourth conference in New York, Nobel physicist Eugene Wigner made his first of many appearances. Wigner was an old player in the Russell-Wells nexus, a lifelong friend of Dr. "Strangelove" Leo Szilard.[16] Wigner soon became a regular at Moon's affairs, along with his former student Alvin Weinberg, the physics incompetent who served as Director of Oak Ridge National Laboratory.

Technology Bad, Genocide Good

At the 1976 conference, in Washington, D.C., the cofounder of the Club of Rome, Sir Alexander King, made his first appearance with Moon, to speak against the "ugly manifestations of technology." Now, there were 600 scientists and academics, from 50 countries, in attendance.

Recall the second point of Wells's program for the Open Conspiracy: "the supreme importance of population control in human biology and the possibility it affords us of a release from the pressure of the struggle for existence. . . ." This was the purpose of the genocidal Club of Rome, whose propaganda provided the backdrop for the 1970s de-industrialization of the U.S.A. and Western Europe. If people could accept "postponing their immediate ambitions and gratifications of immediate desires at least to the extent of providing a liveable world for their children and grandchildren . . . it would at least provide a breathing space," King said in 1976. Today's children and grandchildren can see what they got. The King of geno-

14. Also see Michael J. Minnicino, "The New Dark Age: The Frankfurt School and 'Political Correctness,' " *Fidelio*, Winter 1992.Ever since Thomas Huxley pressed the recluse Charles Darwin to write up his disparate observations in the form of a racialist theory of evolution, the guidelines for biology have been the same. Assert: 1) that man is not different from a beast; 2) that living processes are not distinct from randomly ordered physical processes. The modern project to turn biology into a subset of inorganic physics, known as molecular biology, got under way in the 1940s under the leadership of two retooled physicists of the "no-soul" gang, Niels Bohr's student Max Delbruck, and Leo Szilard. The two guided subsequent developments, Szilard by dominating 1950s sessions at the Long Island, N.Y. Cold Spring Harbor Laboratory (originally named the Cold Spring Harbor Eugenics Laboratory, when it was inaugurated under Harriman and Rockefeller family funding).

Later, that administrative role passed on to James D. Watson. Watson, who bragged in his book *The Double Helix*, of stealing his leads for the structure of DNA from private letters of Linus Pauling, was a product of Deweyite elementary education and the University of Chicago High School, before moving on to Hutchins' University. "The devil made me do it," might be his most honest line of defense.

15. Some scholars believe this is the origin of the term, No-bell Prize.

16. Wigner had known Szilard since school days in Budapest, when the two supported the short-lived Communist revolution of Bela Kun. In 1938, Wigner joined Szilard in talking Einstein into signing the famous letter to President Roosevelt, which caused Roosevelt to begin the secret Manhattan Project to build the atomic bomb. Most of the scientists working on it thought they had to, to prevent Hitler from getting it first. Szilard and Wigner wanted the bomb for Wells and Russell's reason: to attain the superweapon that could force nations to submit to a world empire. Wigner was later the beneficiary of $200,000 in honoraria from Moon.

International Encyclopedia of Unified Science

Editor-in-Chief Otto Neurath
Associate Editors Rudolf Carnap Charles Morris

Foundations of the Unity of Science

(Volumes I–II of the Encyclopedia)

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The Unity of Sciences cult was run out of Robert M. Hutchins's University of Chicago. The table of organization comes from the title page of the 1970 edition of Thomas Kuhn's The Structure of Scientific Revolutions.

cide was to attend and chair many subsequent ICUS conferences.

At the 14th conference, in Houston, free-enterprise economic guru Friedrich von Hayek received the Founder's Award from a Moon stand-in (the Reverend was still in prison on tax evasion charges). That one was chaired by Oak Ridge National Laboratory's Alvin Weinberg, the student of Wigner. Von Hayek kept coming back, bringing with him the Conservative Revolution crowd of the American Enterprise Institute, the Potomac Organization, and others. At the 15th conference, a major theme was unity of religions. Discussion papers included one on a favorite topic of Moon: a piece by a comparative religion expert arguing that phallus cults are simply a form of "worship of the principle of life."

So, the wide net of the Open Conspiracy drew tighter.

Where It Came From

The Unity of Sciences movement had been founded in New York City in the mid-1930s, by a group of admirers of Bertrand Russell among the faculty of Columbia and New York Universities. It drew its philosophical fire from Russell's discredited attempt at a utopian formal logic, the *Principia Mathematica,*[17] and a related offshoot of German philosophical degeneracy, the Vienna Circle of logical-positivism. In the final analysis, the distinction between those doctrines, and what Moon considered to be his most profound discovery ("Why didn't you feel they [your feces] were dirty? Because that's a part of your body.") is a fine one.

It all went back to Thomas Huxley's basic teaching, itself the derivate of a long chain of philosophical decay dating back to Aristotle. The unifying theme was the denial of the nobility of man, as expressed in the provable power of the human mind to create and discover new ideas. For the "no-soul" gang, there is no distinction of man from the beast, nor even from inorganic matter. There is, thus, no soul. To maintain such a view, creative reason must be denied. The mind must be shown to be merely a formal-logical processor, not different from a digital computer. The method of knowing the world, is reduced to analysis of sensory data received at the nerve endings.

The logical-positivist version of the doctrine had been

17. Russell's 1913 work should long ago have been withdrawn from sale, and full refunds issued to all purchasers. In 1931, Kurt Gödel toppled the ivory tower of Russell's formal-logical utopia, and in principle all of logical-positivism, in a work entitled "On Formally Undecidable Propositions of *Principia Mathematica* and Related Systems."

Gödel, although a devoted follower of Leibniz, restricted himself in that work to a formal-logical refutation of Russell's doctrine. Russell was, thus, devastatingly refuted on his own chosen field of battle. However, the underlying assumption of Russell, that truth can be expressed by means of a formal system, had already been refuted 2,500 years earlier in Plato's series of dialectical refutations of the Eleatic school, culminating in the *Parmenides.*

Preceding the *Principia Mathematica,* Russell had authored a book-length attack on the philosophy of Gottfried Leibniz, and a failed attempt to refute Carl Friedrich Gauss's leading student, Bernhard Riemann, on the subject of geometry.

Father and Mother Moon, shown superimposed over the Four Million Couple Blessing in Seoul, Korea, Feb. 13, 2000. In the synthetic belief structure which controls his Gnostic cult, Moon is the patriarch of a "Third Testament Age." To fulfill his role as Messiah, the marriages of his followers must be blessed by him and his wife.

described most nakedly by the Austrian failure of a physicist, Ernst Mach. In his 1886 *The Analysis of Sensations, and the Relation of the Physical to the Psychical,* Mach described his philosophical epiphany at the age of 17. He had been studying Kant's tortured philosophy, when he suddenly saw . . . something:

> On a bright summer day in the open air, the world with my ego suddenly appeared to me as *one* coherent mass of sensations, only more strongly coherent in the ego.

Leaders of the Unity of Science grouping in New York, all members or sympathizers of Trotskyist political groupings, included Ernest Nagel, Sidney Hook, and Albert Wohlstetter (later to achieve fame as the mentor of America's leading Chicken-hawk, Defense Policy Board Chairman Richard Perle).[18] John Dewey, the so-called education reformer most responsible for the present dumbing down of U.S. education, was also prominently associated with the group. Soon, members of the Vienna Circle in flight from Hitler, began arriving in New York. Among them were Rudolf Carnap, Hans Reichenbach, and the man who coined the term Unity of Science, Otto Neurath.[19]

Bertrand Russell visited New York in 1936, on his way to a two-year teaching assignment at the University of Chicago, and met with the members of the Unity of Sciences group. Russell took the movement with him to Robert M. Hutchins's University of Chicago. It grew to national intellectual prominence in 1938, with a well-publicized conference at the University of Pennsylvania, attended by Russell, and followed shortly thereafter by another affair at Harvard.

Soon, the method of Unified Science would take over the teaching of science and mathematics, first in the U.S.A., then the rest of the world. A project called the *International Encyclopedia of Unified Science,* run out of the University of Chicago, published a multivolume series, of which Thomas Kuhn's wretched piece of intellectual dishonesty, *The Structure of Scientific Revolutions,* is the best known.[20] Neurath was the editor-in-chief for the encyclopedia. Rudolf Carnap, another Viennese refugee, and Charles Morris, both of whom frequented Russell's seminar at Chicago, were the associate editors. The advisory committee for the project included Copenhagen School physicist Niels Bohr, John Dewey, and the devil's orphan, Bertrand Russell himself.

18. Albert Wohlstetter became the intellectual father of two naughty children: Richard Perle, and the insane doctrine known as Discriminate Deterrence. Wohlstetter was a graduate student of Ernest Nagel at Columbia, and a member of a Trotskyist splinter group called the League for a Revolutionary Party, headed by B.J. Fields. He broke with that, and in the early 1950s began his career in the Rand Corporation.

    The Rand think-tank was an outgrowth of the same Russell-Wells Utopian circles which had pushed for the napalm bombing of civilian populations in Germany, and the needless and cruel dropping of the atomic bombs on Hiroshima and Nagasaki. Wohlstetter became a leader in that grouping of military incompetents who specialized in devising gaming scenarios, whereby the U.S. would supposedly get an advantage over the Soviets in the Cold War, without actually exploiting any new physical principle. His 1980s version of it was called Discriminate Deterrence. It was all modelled on the ideas of Wells, Russell, and Szilard.

    The other child looked human, even to the big, pouty face. Richard Perle met Wohlstetter when he was a teenager in California in the 1950s, dating his daughter. He dropped the daughter but kept on with her father. "It was a close personal friendship, as well as an intellectual relationship," the *Washington Post* of Nov. 24, 1987 explained. "Wohlstetter's ideas became Perle's ideas; his network Perle's; and, as Perle travelled through the bureaucratic catacombs of Washington, his first mentor remained on call. . . ."

    Today Perle's views include his frequent calls for unilateral, preemptive strikes against Iran, Iraq, and any other Islamic country he chooses, with or without evidence. Perle is a Vietnam era draft dodger, which seems to qualify him to chair the Defense Policy Board. In that capacity, he is a frequent traveller abroad purporting to represent the views of the United States.

19. Neurath was a Viennese communist. In his late 1920s manifesto, titled *Wissenschaftliche Weltauffassung* (Scientific World Outlook), he spelled out the movement's aims:

    "[T]he goal ahead is *unified science.* The endeavour is to link and harmonize the achievements of individual investigators in their various fields of science. From this aim follows the emphasis on *collective efforts,* and also the emphasis on what can be grasped intersubjectively; from this springs the search for a neutral system of formulae, for a symbolism freed from the slag of historical languages. Neatness and clarity are strived for, and dark distances and unfathomable depths rejected."

    Striving for "neatness and clarity," Neurath himself would soon be working on his greatest contribution, the icon system known as ISOTYPE, which would allow one to distinguish the men's room from the ladies' in international airports.

20. Kuhn's book, still widely read on campuses today, was first published by the University of Chicago Press in 1962, as Volume 2, Number 2 of the *Encyclopedia of Unified Science;* it was reissued by the same press in 1970, and subsequently.

    The fraud behind Kuhn's popularized term "paradigm shift" is very simple. Kuhn does not believe in truth. Apart from his incompetent interpretation of nearly every actual breakthrough in science, Kuhn does not suppose any such breakthrough to be a matter of actual human progress. Kuhn's "normal science" is H.G. Wells's doctrine of the scientist as "worker bee," as elaborated in *The Open Conspiracy.*

Postscript: A Note on Moon's 'Theology'

Moon's is a Gnostic doctrine, not of his own invention. The method of propagating cults, as a means of maintaining subject populations under the rule of an imperial power, goes back at least as far, in known history, as the Babylonian Empire. The Romans learned it from the high priests of the East, whence it passed along, by way of Byzantium, to Venice, the leading maritime power up to the 17th Century. From Venice, it penetrated into England, and eventually became a standard piece in the repertory of the British Empire's intelligence services.

The specific cult doctrine known as Gnosticism came to the Hellenic world by way of the Persian domination of Mesopotamia. It originated as a form of mystery worship of astronomical deities, including a father (or "original man") and great mother god, sometimes Venus, or, in an Egyptian-derived variant, Isis (Sirius). The number seven has mystical significance as the number of the five visible planets, plus the Sun and Moon.

In the form of the Gnostic heresy deployed against early Christianity, the primal or original man, becomes Christ. In some versions, such as that presented in the popular book, *Holy Blood, Holy Grail,* Christ did not die on the cross, but married Mary Magdalen, migrated to Europe, and had children, who became the British ruling family by way of Angevin and Plantagenet lineage. This published hoax is a variant on the form of British Israelism believed by many members of the British elite today. In another common variant, the actual Jews are thought to be the children of Eve's copulation with Satan (the serpent); the other descendants of Adam allegedly went elsewhere. In other versions, Christ did not marry, which is, itself, alleged to be an error.

Moon's religion is a syncretic variant upon these diverse Gnostic doctrines, created as a cult belief-structure, for purposes of mass manipulation. Moon believes that he is the Father of a "Third Testament Age." The first was tainted by Cain's crime against his brother. Christ failed to have children, and thus the Second Testament Age was not fulfilled. Father and Mother Moon (that is, Sun Myung and his second wife Hak Ja Han) are the parents of a new race of "blessed" people of the Third Testament Age. Although Moon apparently once thought he could father all the children single-handedly, age caught up with him. It was determined that he and his wife could become the parents of the new generation, by presiding over mass blessings of marriages. Tens of thousands of couples may participate at one time. Moon, now 82, believes himself the Messiah, but not immortal. Therefore, these affairs must be conducted as widely and quickly as possible. A big one just occurred near Washington, D.C., Dec. 7, 2002.

That, folks, is the hard truth about the world's largest Gnostic Sex-Cult Freak Show.

Is your rabbi, imam, priest, or pastor co-habiting with the devil? Is he sporting a new gold watch, perhaps a new girlfriend, or a Moon-blessed wife? Do you, including the unchurched among you, imagine yourselves free of this influence? When was the last time you picked up a copy of a publication in science, culture, history, or any field of intellectual endeavor, that did not have the imprimatur of the Russell-Wells "no-soul gang" stamped all over it? Have you any independent thought respecting man and nature, which is not derived from, or influenced in some way, by the philosophical premises of the "no-soul" gang? Think about it. Much is riding on your conclusion.

Sources

The essential thesis for this report is contained in two groundbreaking historical studies by Lyndon H. LaRouche, Jr.: "How Bertrand Russell Became an Evil Man," *Fidelio,* Fall 1994, and "Today's Nuclear Balance of Power: The Wells of Doom," *Executive Intelligence Review* (EIR), Dec. 19, 1997. The author had the rich outline of these concepts rattling around his brain when he undertook recently to look into the origins of the Unity of the Sciences Movement. Discovering the Russell, Dewey, Hutchins, Niels Bohr nexus of control leading into the 1970 re-publication of Thomas Kuhn's *Structure of Scientific Revolutions,* the question arose: How did this operation become integrated into the Moonie empire, beginning 1972, with the prominent assistance of Leo Szilard's partner, Eugene Wigner? A re-reading of Wells's *The Open Conspiracy,* pointed to the significance of Buchman's Oxford Group/Moral Re-Armament Movement, which spawned the Moon cult, as the tactical realization of Wells's call for a mass peace movement. A closer look at the Unity of Science doctrine combined with the second part of Wells's "modern Bible scheme," his *Science of Life,* helped to answer a question which had been part of the immediate motivation for this research: Who killed science?

The EIR archive of unpublished reports dating back to 1978 proved an invaluable source of material. An overview was provided by re-reading of the 1980 work *The New Dark Ages Conspiracy,* a book-length elaboration by his collaborators of LaRouche's original thesis on the Russell-Wells "no-soul gang."

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Marie Sklodowska Curie: The Woman Who Opened The Nuclear Age

by Denise Ham

A new look at a revolutionary scientist's passion for truth, and how she inspired a generation of Americans.

AIP Niels Bohr Library

Marie Sklodowska Curie (1867-1934) in her laboratory.

In my quest to examine the life of Marie Curie, I had the good fortune to rediscover her life's work, particularly her discovery of polonium and radium, and her great discovery concerning the nature of the atom. In this journey, I was happy to become intimately aware that discovery itself, is an issue of passion. It surprised me considerably that my understanding of her work grew enormously, because I simply loved trying to understand that which she discovered. Since my formal education is more than bereft, especially in science, I think that I am fortunate in being able to discover in myself that very passion for knowledge which drives the creative individual to make critical discoveries that transform the physical universe. I have many people to thank for helping me in this project, which took more than a year; foremost, I wish to thank Madame Marie Sklodowska Curie, and say that her life is an inspiration which I have loved.

Part I

A Commitment to Truth

The year 2003 is the 100th anniversary of Madame Curie's first Nobel Prize. In 1903, she, along with her husband, Pierre Curie, and the physicist Henri Becquerel, won the prestigious prize in physics for their joint work in radioactivity. It was only the third year that the prize had been given, and Marie was the first woman to receive it. Eight years later, Marie Curie received an unprecedented second Nobel Prize, this time in chemistry, for her work with radium.

The genius of Marie Curie can best be understood from the standpoint of her commitment to truth. Curie was a friend and colleague of the great Russian scientist Vladimir Vernadsky. Vernadsky spent a great deal of time working in the Paris Radium Institute, which she created in 1914, and ran until her death in 1934. Indeed, our biosphere had been transformed by the creative work of Curie, Vernadsky, Pasteur, and many others—a change imposed upon it via cognition.

Madame Curie's discovery of the radioactive substances radium and polonium, her initial hypothesis on the nature of uranium being a radioactive substance (she was the first to use the term, "radioactivity"), and her correct insight into the power of uranium (and that of all radioactive substances) as derived from the atom itself, was revolutionary. Her hypothesis of the existence of other radioactive substances, and her relentless search for those substances in mountains of discarded pitchblende (a uranium ore), under the most deplorable and hazardous conditions, is the stuff legends are made of—but it is also *true*.

Marie and Pierre Curie's discovery totally transformed the physical universe in which we live. Although it is true (and often repeated) that Marie and Pierre Curie's work in radioactive substances took a toll on their physical well-being, they would not want to be remembered as "victims" or "martyrs" to the nuclear age. They were deeply committed scientists, who loved truth and beauty, who made significant discoveries that alleviated human suffering, and left a legacy to mankind to be cherished forever.

Marie Sklodowska Curie was not simply a great scientist; she was a magnificent human being, and her love of science and her commitment to truth were reflected in her personal character, which was beyond reproach. To understand her commitment to scientific truth, one must understand the passion behind it. A too often misused word, passion is really the emotional guiding principle behind creative discovery. Creativity without passion, does not exist.

Marie and Pierre Curie's work in radioactivity revolutionized science in the late 19th Century. Marie Curie's hypothesis that radiation was "an atomic property" transformed forever how man would view the atom. There are some biographers who have said that this, and only this, was Marie Curie's great discovery, but that is not true. It was only the first step, which she boldly took, in her 36-year odyssey with radioactive substances. In discovering the nature of nuclear power, much of her work was intimately tied to medical research in particular the use of X-rays for diagnosis, and radioisotopes for cancer treatment. The later discoveries in fission, which would prove to be the next step in harnessing the power of the atom for energy production, were later accomplished by her admirer, another woman, Lise Meitner.

The attack against nuclear energy, and the fear of nuclear science by the population today, is an attack against all scientific progress. The irony is almost too funny: Nuclear science was created and developed by the fairer sex! The idea behind the discoveries was to better mankind, by creating new cures for disease, and producing cheap energy for the planet.

Another irony is the fact that the American population had a love affair with Marie Curie. She was invited to this country twice in the 1920s, and millions of women contributed money to buy her a supply of expensive and rare radium for her research. Radium, one of the most radioactive substances, was discovered by Marie back in 1898.

In discovering a new, renewable resource for mankind, progress could be attained. The world's population could thrive. The zero-population growth movement's ideology would be the laughingstock of future generations. The world needs this science, and it needs more scientists of the caliber of Marie Sklodowska Curie who said: "Nothing in life is to be feared—it is only to be understood."

Manya Sklodowska: The Story of Marie Curie's Youth

Manya Sklodowska was the youngest of the five children of Vladyslow Sklodowski and Bronislawa (née Boguska) Sklodowska, born November 7, 1867, in Warsaw, Poland. Since 1795, Poland had been cut up and absorbed into three countries: To the east was Russia (including Warsaw); to the south was the Austrian Empire; and to the west was Prussia. Despite the fact that Poland was not listed on any map of the time, the national identity, language, and culture of Poland never died.

In the 19th Century, there were two uprisings against the Russian masters, the second one launched five years before Manya's birth. During that revolution, thousands were killed, 10,000 Poles were sent to Siberia, and a minority grouping escaped to Paris. Both of Marie's parents had brothers who were sent to Siberia, and one uncle went into exile to France.

Manya's parents were also revolutionaries, but they believed in revolution through ideas. Members of the intelligentsia, the Sklodowskis believed that Poland could become free only through the development of the mind—science—and through much hard intellectual work. Twenty-five years before his youngest daughter's birth, Vladyslow, a teacher of physics and chemistry, wrote a poem in which he exhorts his countrymen to achieve freedom, not by picking up arms, but by achieving freedom in the search for truth:

> Separated, divided, we are individual and helpless, each looking into the future with apprehension, with fear, each preoccupied with his own small worries, each pursuing a fainthearted course on a narrow road.
>
> Our hearts and minds are busy, our souls no longer house great emotion. All we are is cold, dark, silent, barren.
>
> But suddenly, the storm roars, the thunder cracks. The foundation of the world shakes. Satan's powers cringe,

Prof. Sklodowski and his daughters (from left), Manya, Bronya, and Hela, from an 1890 photograph.

agonized, in fear. This is the end of the age of error and of treason.

Let us break this armor of ice that binds our chests Let us begin today, bring stones to build the temple of truth, the temple of freedom. Let our willpower cure our crippled souls. Let our hard work prove to the world, to God, to our country our worth. . . .

"To the future!" Let us lift our glasses, Dear Brother. Let us offer our pain and our lives to that future. Work, love, and live Brothers! [as cited in Quinn 1995]

Vladaslow recognized that an armed revolution against the much stronger Russia, would amount to defeat. Like many intellectuals in Poland, he thought that education of all Poles, armed with science and technology, must be the answer to achieving a secure nation-state. Unlike many European countries, the division of classes in Poland was not by "royal birth," but was based on the educated versus the uneducated. The Sklodowskis and their children, knew that the only route to nationhood was through the elevation of the peasantry by education.

Vladaslow Sklodowski used his children's playtime for pedagogy, educating them in science, mathematics, literature, and poetry. For example, Manya and her father exchanged letters, while she was working as a governess, in which he posed mathematical problems, and she sent her solutions in her answering letters. In nature trips to the Carpathian Mountains, Vladaslow sat with his children, and taught them the scientific phenomenon of sunsets.

More often, he would read poetry and literature to them in one of the five languages he knew, while simultaneously translating the work into Polish. In fact, for a while, Manya, the woman who would become one of the greatest scientists of the 20th Century, seriously contemplated the idea of becoming a writer, or a poet. As the youngest child, she quickly learned to read at the age of four, and entered school two years younger than her peers. She mastered Russian, which was the required tongue at school and in professional life in Warsaw.

The Russian authorities had decided to wipe out any trace of "Polish" identity, so all lessons were taught in Russian. Eve Curie describes in her biography of her mother, *Madame Curie,* how much the Polish children hated this system. There was a conscious conspiracy in Poland between the teachers and students. There were two sets of lessons, and two sets of books in the grammar schools. For example: A lesson in Polish history, spoken in Polish, would be given by a teacher, but if the Russian masters were to suddenly come into the school, a warning signal was communicated, and the "proper" books, would appear, and Russian would be spoken. The penalty for being caught teaching in Polish was a trip to Siberia.

At the age of 16, Manya graduated, receiving the gold medal for finishing first among girls in Warsaw. Her father decided that because of her hard school life, she needed a rest after graduation, and he sent her to the countryside to live with her cousins for a year.

Manya's older brother, Josef, had studied medicine in Warsaw, but no higher education was offered for the young women in Poland, Therefore, when her oldest sister, Bronya, decided to study medicine, her choice was to go to St. Petersburg or France, both of which entailed financial concerns for the family. Years earlier, Father Sklodowski's beliefs had enraged the Russian school bureaucrats, and he was moved from being one of Warsaw's top teachers in high school, to ever lower-paying positions. Also, Mrs. Sklodowska had succumbed to tuberculosis years earlier, so the only paycheck in the household was far from enough to send young Bronya away from Poland to study medicine.

Although Manya Sklodowska also wished to further her studies, she gladly offered to go to work to help put Bronya through school in Paris, thus demonstrating one of the hallmarks of her character, her selflessness and her love of others. Although she was only 17 years old, she decided to work

as a governess in a small Polish village, hundreds of miles from Warsaw. She earned 500 rubles a month, which was a hefty sum for a young girl, and her room and board were provided for, so that the bulk of her earnings could be sent to her sister.

Bronya promised Manya that she would take care of her when her turn came to study, and that promise was kept. Throughout their lives, each sister worked tirelessly on behalf of the other. Their devotion was mutual.

Life in the Country

Young Manya's life as a governess, in the town of Szczuki, miles away from her family and the city she loved, were difficult, yet she made the best of it. She devoted herself completely to her young charges, and when she found that she had more than enough time for herself, she suggested to her employer that she give private classes to the local peasant children, who had no school. Her employer agreed that this was the right thing to do, and in defiance of the Russian authorities, who were many miles away, she taught the children *in Polish*.

In letters to her good friend, Kazia, she wrote of her classes:

> . . .I have many hours of lessons with Andzia, I read with Bronka [the two children she is in charge of], and I work an hour a day with the son of a workman here, whom I am preparing for school. Besides this, Bronka and I give lessons to some peasant children for two hours a day. It is a class, really, for we have 10 pupils. They work with a very good will, but just the same our task is sometimes difficult. . . .

In the next letter, three months later, she says:

> The number of my peasant pupils is now 18. Naturally they don't all come together, as I couldn't manage it, but even as it is they take two hours a day. . . . I disturb nobody. Great joys and great consolations come to me from these little children. . . [Curie 1937, p. 68].

A page from Manya Sklodovska's private notebook, written in 1885, with her drawing and a poem of Heine in German.

It was also during this period in Szczuki, that she attempted to educate herself in chemistry. Her employer allowed her to to go the factory library, and the chemist employed there was so impressed that he gave her 20 lessons. However, this was not enough to satisfy her immense curiosity. She wrote to her brother, Josef, in October 1888: "I am learning chemistry from a book. You can imagine how little I get out of that, but what can I do, as I have no place to make experiments or do practical work?"

Manya's Informal Education: Her Teacher Josef Boguska

After spending five years as a governess, Manya returned to Warsaw. During this period in Poland, there existed an "underground" college, known as the Floating University, where young men and women could study with trained individuals. This was especially important for the young women, who had no where to turn for advancement, except to leave the country. The Floating University was run by Polish patriots, who saw this as a pathway to eventual freedom for their nation. Manya and others (including the Polish economist Rosa Luxembourg), were here introduced to philosophy, progressive politics, and to the latest developments in chemistry, physics, and physiology.

Part of this informal education meant going to the Museum of Industry and Agriculture, which, in reality, was a cover for a scientific laboratory, run by Manya's cousin, Josef Boguska. Educated in St. Petersburg under the great Russian scientist Dmitri Mendeleev, Boguska had also worked as a laboratory assistant for Mendeleev.

Mendeleev is the father of the Periodic Table of the elements, and was one of the most advanced intellectuals in the world at that time. More than 10 years later, when Manya Sklodowska had become the great scientist Madame Marie Curie, she would write often to Josef, sharing with him her discoveries. Josef would, of course, be forwarding all this information to St. Petersburg to his teacher. Mendeleev also visited Paris at the time that Marie Curie lived there. Although it is difficult to know if they actually met one another, they certainly were well aware of each other's work.

Laboratories were banned in Poland. During Prof. Sklodowski's entire life as a teacher of science, he never had access to a laboratory. It was at this time of her life, in the Floating University, that Manya fell in love with science and experimental work, and made the decision to become a scientist. In her *Autobiographical Notes,* written in 1923, she said:

> . . . [D]uring these years of isolated work, trying little by little to find my real preferences, I finally turned towards mathematics and physics, and resolutely undertook a serious preparation for future work.

During this period in Warsaw she wrote:

> I had little time for work in this laboratory. I could generally get there only in the evening after dinner, or on Sunday, and I was left to myself. I tried to reproduce various experiments described in the treatises on physics or

chemistry, and the results were sometimes unexpected. From time to time a little unhoped-for success would come to encourage me, and at other times I sank into despair because of the accidents or failures due to my inexperience. But on the whole, even though I learned to my cost that progress in such matters is neither rapid nor easy, I developed my taste for experimental research during these first trials.

Most important, however, is the method or epistemology that she learned at the hands of her cousin. The ideas of Mendeleev, in particular, the idea that there were a great many elements yet to be discovered was planted in her fertile mind. Mendeleev had predicted the appearance of many new elements, describing in detail where they would appear on the Periodic Table.

To Paris!

One day in 1891, Manya received her dearest wish, when Bronya wrote to her that she must come to Paris. Bronya had met and married a fellow Polish exile, Casimir Dluska. Dluska was also a doctor, and had been forced to flee Poland because of his political activities. In October of that year, Manya arrived in Paris, and entered the Sorbonne (the University of Paris) as a student of physics. In France, she changed her name to the French, Marie. Her plan was to study physics, and return to Poland to be with her beloved father, and to make a revolution with ideas. The Dluskas lived in Paris's famous Latin Quarter, which at that time was filled with Polish exiles and students. They loved the theater, and socialized politically with many of Poland's future leaders. It was here that Marie met the men who would later bow to her as the queen of science. At one event, accompanied by her sister and brother-in-law, she heard a wonderful young Polish pianist, Ignace Paderewski, the future Prime Minister of a new Polish Republic. She also became friends with the young Wojciechovski, who became the President of Poland.

Although Bronya and her husband opened their apartment to Marie, she desired independence. For several reasons she decided to leave their abode. One, was the fact that she found herself socializing to a much greater degree than she wanted to; she wanted to devote herself entirely to study. Second, she wanted to be much closer to the university. She found an apartment in a fifth-floor walk-up, with no heat and no electricity, but much closer to school. Although the rent ate up the little savings she had, she preferred this arrangement. There were times, however, Eve Curie wrote, that her mother had to be carried to the Dluskas because she had collapsed from hunger. Marie Curie's daughter also wrote that her mother had to use every stitch of clothing and all of her furniture to cover her in the dreaded cold of winter. Though these days were certainly difficult, Marie Curie, always spoke of them with happiness.

In 1893, she graduated at the top of her class in physics. The only woman who completed her studies in physics, Marie Sklodowska received what would be considered a masters degree in the United States. The following year, she received a scholarship from Poland, and she graduated second in mathematics. She never forgot the scholarship, and after graduation, she paid back every cent of the money (which was, of course, unheard of). Later, after she became a famous scientist, she personally provided the funds to have a student from Poland study at the Radium Institute every year.

Part II

Life with Pierre Curie

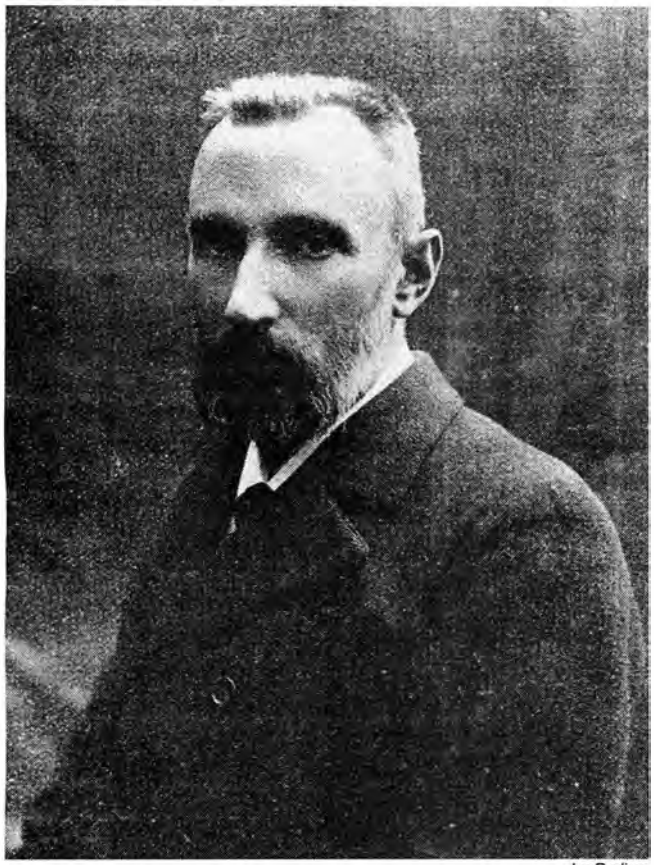
Marie had planned to return to Poland after she received her formal education, but one of the organizations formed after the Franco-Prussian War to promote the cause of French science hired her to do research. The Society for the Encouragement of National Industry wanted her to conduct a study of the magnetic properties of steel. Because she lacked a proper laboratory environment to do these studies, she began to enquire about the use of other facilities.

In January 1894, Polish physicist Jozef Kowalski, a professor at the University of Fribourg, and his new wife, who happened to be in Paris at the time and who had known Marie when she worked as a governess in Poland, suggested a meeting with a French physicist who worked at the School for Physics and Chemistry. His name was Pierre Curie.

Pierre Curie was born on May 15, 1859, the second son of Dr. Eugene Curie, who was himself the son of a doctor. He was a brilliant scientist who was trained, first, by his father, and then with a tutor, as his father believed that Pierre had unusual talents which might be missed by formal schooling. He began his university study at the age of 16, and received the equivalent of a masters degree at age 18. Pierre did not receive his doctorate until after he met Marie, because his financial situation had forced him to become the head of student laboratory work in physics at the Sorbonne. However, Pierre was never one to be concerned with titles. He demonstrated such a commitment to science, that he made many original discoveries, and went on to do his own research at the School of Industrial Physics and Chemistry in Paris, while he taught there. Although the laboratories at the school were not the best, Pierre never complained.

Pierre's brother, Jacques, although several years older, was his best friend and scientific partner for several years. Together, they worked on the piezo-electric effect. (*Piezo* is from the Greek word to press.) In 1880, Jacques and Pierre discovered that when pressure is placed on specific crystals, like quartz, they can create a voltage. In an electrical field, these same crystals become compressed. Armed with this knowledge, the Curie brothers created a new device, the quartz piezo-electroscope or electrometer which can accurately measure very slight electrical currents. Today, this concept has been applied in quartz watches, microphones, and other electronic components. The quartz piezo-electrometer also played a key role in the discovery of new radioactive elements at the hands of Marie and Pierre.

When Jacques left Paris to become the head of mineralogy at the University of Montpellier, Pierre began pioneering work on magnetism. Pierre looked at the effect of temperature changes on magnetism, and saw that some materials change their magnetic properties under different temperature conditions. Today, in honor of Pierre's work, the term



Le Radium

Pierre Curie (1859-1906)

"Curie point" is used to describe the temperature at which these changes take place. Another device named after him is an extremely sensitive scientific balance. Pierre also followed up the work of Louis Pasteur, with his studies on crystal symmetry:

> A still deeper connection exists between Pasteur and the Curies. Pierre Curie himself was a conscious advocate of the Pasteurian ideas in chemistry and biology. His works on the symmetry characteristics of natural processes established a direct relationship between Pasteur's discovery of the molecular dissymmetry of living processes and fundamental questions of inorganic physics. A half century later the Chinese woman physicist, Chien-Shiung Wu, carried out an experiment with beta rays which refers to a fundamental dissymmetry in the processes in the atomic nucleus and continues to supplement the old ideas of Pasteur and Curie [Tennenbaum 1994].

The backgrounds of Marie and Pierre nearly mirror one another in that both had "republican" families. Pierre's father, Dr. Eugene Curie, was a republican, who manned the barricades in the revolution of 1848, and had his jaw shattered by fire from the government troops. Paris was later hit by a cholera epidemic, and while other doctors left the area, Dr. Curie stayed on ministering to the victims. In another revolution in 1871, Dr. Curie allied himself with the republican cause, and turned his apartment into an emergency room to treat those who were wounded. Pierre, at age 12, and his older brother, Jacques, would canvass the streets in the evenings, bringing back the bloodied victims who had fallen in the day's fighting.

Pierre was 35 years old and unmarried when he met Marie. In fact, Pierre had despaired in ever finding a woman who he could share completely his love and devotion to science and humanity. When he was younger, he wrote in his diary:

> Woman loves life for the living of it far more than we do: women of genius are rare. Thus, when we, driven by some mystic love, wish to enter upon some anti-natural path, when we give all our thoughts to some work which estranges us from the humanity nearest us, we have to struggle against women. . . [Eve Curie 1937, p. 120].

The courtship lasted over a year, because Marie had to choose between Pierre and returning to her beloved Poland—her lifelong plan—to teach science, and to be with her now-elderly father. It is the good fortune of humanity that Marie relented, returned to Paris, and married Pierre in July 1895.

The Years of Great Discoveries

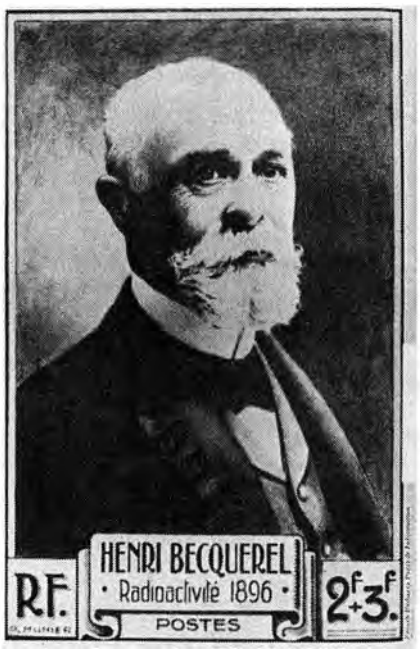
The years 1895 to 1898 were momentous ones for science. First, Wilhelm Roentgen amazed the scientific world with his discovery of X-rays, and so was born the "atomic age" on November 8, 1895. Roentgen took a pear-shaped cathode ray tube, and partially connected it in a circuit. He surrounded this with black cardboard, and after completely darkening the room, he passed a high tension discharge across it. All he wanted to see was whether the black cardboard was able to shield the tube. When he found that it did, he began moving towards his apparatus, in order to continue the experiment, but when he got about a yard from the tube he saw a glimmer of light.

He then lit a match to see from where the light came. What he found, was completely unexpected: he saw the small card coated with barium platinocyanide luminescing, in spite of the fact that it was totally shielded from the cathode ray by a thick sheet of cardboard. When he turned off the tube, the barium-coated card stopped glowing. He turned it on again, and again it glowed.

The next month, he gave a lecture on his discovery. He photographed the hand of the famous anatomist Albert von Koelliker, and when he developed the plate, the old man's bone structure appeared. There was a worldwide shout of applause. In the United States, his experiment was reproduced, and for the first time in history, doctors were able to locate a bullet in a man's leg.

Within a year, there were nearly 50 books and more than 1,000 articles about "Roentgen rays." For the first time since the ancient Greeks, the structure of matter could be analyzed. The old ideas of atoms being solid, impregnable particles, which had been dogma for centuries, was being overthrown.

Everyone in the scientific world rushed with ideas towards a more thorough understanding of X-rays. One of those scientists was the Frenchman, Henri Becquerel. His idea concerned uranium salts. Becquerel thought that when exposed to sunlight, uranium salt crystals, could produce an exposure on a photographic plate, and emit X-rays. In an experiment on February 26 and 27, 1896, he wrapped some photographic plates in black cloth, covered it with a sheet of aluminum, then placed the crystals of potassium uranyl sulphate on top of the aluminum. Because it was cloudy in Paris at the time, and he wanted to see the effect of sunlight on the crystals, he put his experiment in a dark drawer and closed it, to wait for a sunny day. On the following Sunday, he came into work, and saw that the salts had emitted rays onto the photographic plate while it was in the dark. He had discovered radioactivity. It was Marie Curie's job to explain to the world what this phenomenon was, and to discover new radioactive elements.



French postage stamp commemorating Henri Bequerel, who in 1896 discovered natural radioactivity in uranium salts. Bequerel and Pierre and Marie Sklodowska Curie won the Nobel Prize in Physics in 1903 for their work in radioactivity.

The significance of Becquerel's discovery was not immediately acclaimed by many scientists. It was thought interesting, but did not generate much enthusiasm, because it was not understood. Marie and Pierre read Becquerel's paper, and Marie decided to adopt the idea as the basis for her doctoral thesis. Meanwhile, Marie and Pierre had their first daughter, Irène, in September 1897. Irène would follow in her mother's footsteps in science, and she and her husband, Frédéric Joliot, would discover artificial radioactivity, winning the Nobel Prize in Physics in 1935.

Marie began her experiments at Pierre's teaching lab, the School of Physics and Chemistry, with the approval of the director, M. Schützenberger. Pierre had been at the school nearly 15 years, and the kindly director (who was called Papa Schutz) helped the Curies in countless ways.

Marie's plan of attack, was to see whether this property of "radiation" existed in the other known elements on the Periodic Table. Pierre helped her by giving her complete access to his quartz piezo-electrometer, to measure the electrical charge that was known to be emitted from uranium salts. Marie's experiment was to gather all the known elements she could beg from laboratories and university departments, and to put them all to the test. She would put her substance on a small metal plate, opposite another metal plate, which would operate as a condenser. She used the electrometer to see whether there was an electric current in the air between the plates.

She tested all the known elements and minerals, with complete thoroughness, over and over, and shortly found one other element, thorium, which generated electrical activity. Then, she used the electrometer to measure the intensity of the current, and using different compounds of uranium and thorium, she found that what mattered was the amount of uranium present, not whether it was wet or dry, powdered or solid. Marie wrote that radiation energy had a completely different genesis from chemical generation and must come from the atom itself. It was not the interaction of molecules, or new shapes of molecules as in a chemical reaction. In her experiments, she included two minerals, pitchblende and chalcolite, ores from which uranium is extracted.

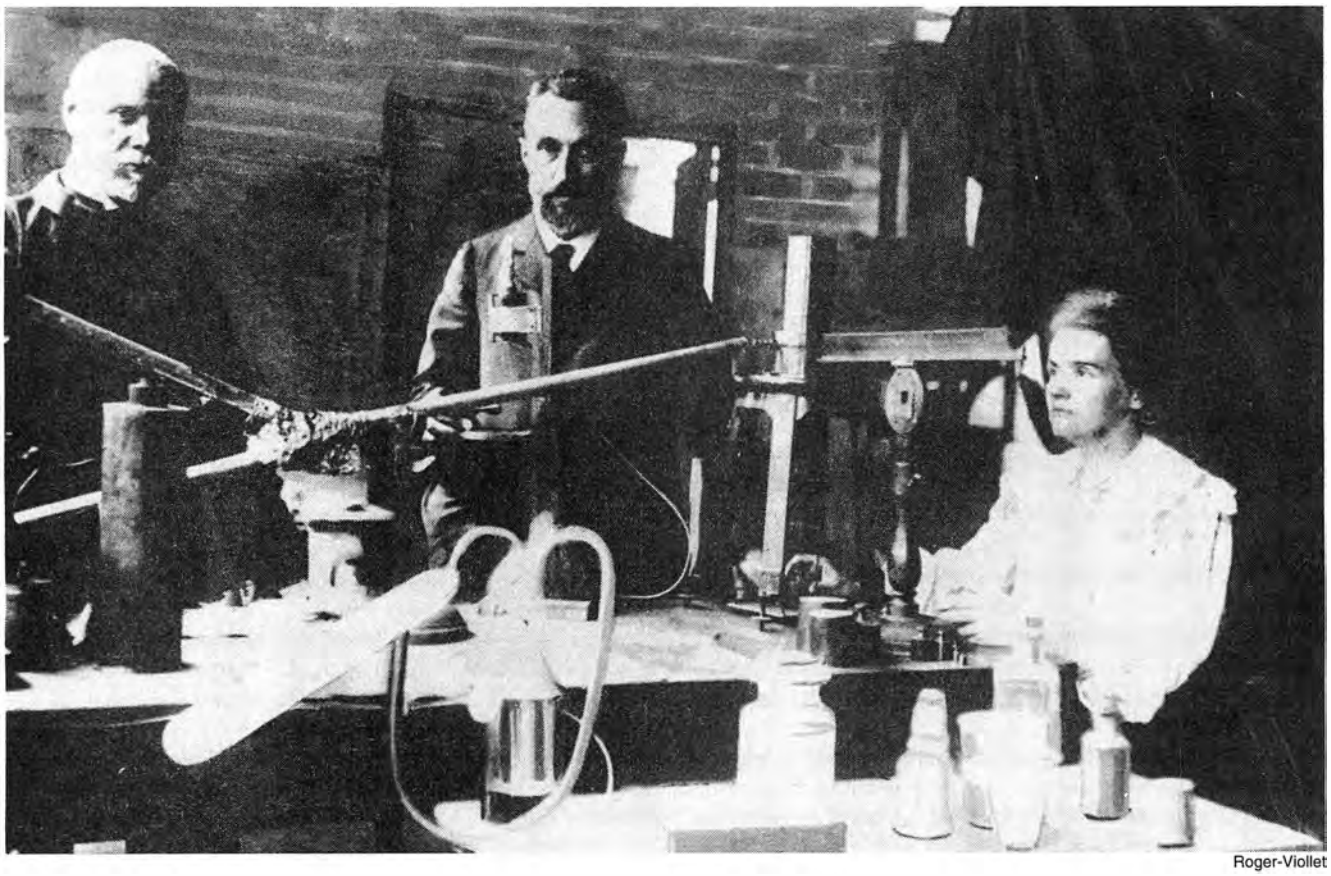
When she measured pitchblende that was devoid of uranium, she discovered that the electrical conductivity was four times greater than that of uranium itself, and that the conductivity of chalcolite was twice as great. This was the paradox she confronted: How could this be possible, since there was no uranium, no thorium present? It is always at critical moments, such as these, that such paradoxes become most exciting for the creative mind. This is what drove Marie to leap boldly onto an hypothesis taking shape in her mind.

> It therefore appeared probable that if pitchblende, chalcolite, and autunite possess so great a degree of activity, these substances contain a small quantity of a strongly radioactive body, differing from uranium and thorium and the simple bodies actually known. I thought that if this were indeed the case, I might hope to extract this substance from the ore by the ordinary methods of chemical analysis [Curie 1961 (1903), p. 16].

Pitchblende is composed of almost 30 elements, and present in this elemental curry, is an extremely powerful radioactive source in a very minute part. How little it actually was, however, would astonish not only the Curies but the whole world. Marie and Pierre initially thought that it could be about 1 percent of the pitchblende. At the end of almost four years, they found that it was less than 1/1,000,000th of 1 percent.

Marie Curie, the scientist, is unlike most any other of her time—and now. Her mind worked like a true Platonic scientist. She was an experimental scientist, who believed first in the primacy of ideas. In January 1904, just after she, Pierre, and Henri Becquerel had won the Nobel Prize for Physics in November 1903, the American *Century Magazine* published an article by her, which leaves no room for doubt of her genius for hypothesis formation, and her rigor for experimental proof.

> The discovery of the phenomena of radioactivity adds a new group to the great number of invisible radiations



Roger-Viollet

Pierre and Marie Curie in their crude "laboratory," an unheated shed in the courtyard of the School of Physics and Chemistry, described by one visiting scientist as "a cross between a stable and a potato-cellar." On the table is Pierre's quartz piezo-electrometer.

now known, and once more *we are forced to recognize how limited is our direct perception of the world which surrounds us,* and how numerous and varied may be the phenomena which we pass without a suspicion of their existence until the day when a fortunate hazard reveals them. . . .

[Electromagnetic radiations] . . . are present in the space around us whenever an electric phenomenon is produced, especially a lightning discharge. Their presence may be established by the use of special apparatus, and *here again the testimony of our senses appears only in an indirect manner.* . . [*Century Magazine,* 1904, emphasis added].

Towards the end of the article, she presents the world with the fruits of their labor, which began in the winter of 1897, and continued unrelentingly to the day of the article. Although a few other scientists, namely Sir Ernest Rutherford, also knew and understood this newly discovered phenomenon, she would be the major spokesman, for her discoveries of radium, polonium, and actinium (the latter with the help of fellow scientist, André Debierne). All three elements were found in more than 4 tons of pitchblende.

If we assume that radium contains a supply of energy which it gives out little by little, we are led to believe that this body does not remain unchanged, as it appears to, but that it undergoes an extremely slow change. Several reasons speak in favor of this view. First, the emission of heat, which makes it seem probable that a chemical reaction is taking place in the radium. But this is no ordinary chemical reaction, affecting the combination of atoms in the molecule. No chemical reaction can explain the emission of heat due to radium. Furthermore, radioactivity is a property of the atom of radium; if, then, it is due to a transformation, this transformation must take place in the atom itself. Consequently, from this point of view, the atom of radium would be in a process of evolution, and we should be forced to abandon the theory of the invariability of atoms, which is the foundation of modern chemistry [M. Curie 1904].

In the years before this paper was written, Marie and Pierre had an enormous amount of work to do. First, they wrote to the mine that produced the most active pitchblende that they tested, which belonged to the Government of Austria at Joachimsthal in Bohemia. They were given their first ton of discarded material, and paid the cost of shipping.

They began work in earnest in December 1897, and

Extracting radium in the shed laboratory.

Pierre gave up his research into crystals, in order to help his wife with the project. Pierre involved himself in the physics behind the new substances, and Marie spent most of her time extracting elements from the pitchblende. Each 50 kg of raw pitchblende had to be prepared precisely, and accidents and weather factors sometimes interfered with the process.

The Curies also faced another problem, which is discussed at length in the later part of Marie's thesis: radon gas. The makeshift laboratory in which they worked was contaminated with radon. Although at that time, radon was not yet thoroughly understood, nor even classified as an element, they knew that "emanations" from radium were making their work increasingly difficult. It played havoc with their equipment, and their health.

To understand the whole chemical process, one should read Marie's doctoral thesis, wherein this is described in precise detail. A factory method was organized for each batch of material. Sulphates had to be converted to carbonates. The raw mass was boiled in various concentrations, over and over, to avoid certain chemical processes that would fuse elements and destroy the experiment. They got residues of lead, calcium, silica, alumina, iron oxide, copper, bismuth, zinc, cobalt, manganese, nickel, vanadium, antinomy, thallium, rare earths, niobium, tantalum, arsenic, barium, and so on.

After each separation, Marie devised an elegant chemical procedure known as fractional crystallization. When a solution is boiled and then cools, it causes the formation of pure crystals. For example, if you want to make rock candy, you boil sugar and water, and upon cooling, you end up with the formation of pure sugar crystals (candy). Fractional crystallization is more difficult than making candy, because the chemist must know everything about the elements he is dealing with, the crystals that will form, at what temperature that formation will take place, the atomic weights of the elements that are being boiled, which elements will crystallize first, and so on.

After each element is crystallized, the Curies used the quartz piezo-electroscope to see if there was an electrical charge, which would tell them if they had radioactivity in their batch. The test is repeated over and over, from fractional crystallization, to crystal, to the point where they measured for electrical charge. If the sample has an electrical charge, it may contain a radioactive substance. One element after another was eliminated in this fashion. One thing not known in the beginning to the Curies or to their assistant André Debierne, was that there was more than one radioactive substance in the pitchblende. There were three!

By April 12, 1898, four months after they began, they knew they had found a new element, and they proposed a name for it—polonium. Here are excerpts from Marie Curie's paper, presented to the French Academy of Science by Henri Becquerel:

> Certain minerals containing uranium and thorium (pitchblende, chalcolite, uranite) are very active from the point of view of the emission of Becquerel rays. In a previous paper, one of us has shown that their activity is even greater than that of uranium and thorium, and has expressed the opinion that this effect was attributable to some other very active substance included in small amounts in these minerals. . . .
>
> The pitchblende which we have analyzed was approximately two and half times more active than the uranium in our plate apparatus. We have treated it with acids and have treated the solutions obtained with hydrogen sulfide. Uranium and thorium remain in solution. We have verified the following facts:
>
> The precipitated sulfides contain a very active substance together with lead, bismuth, copper, arsenic, and antimony. This substance is completely insoluble in the ammonium sulfide, which separates it from arsenic and antimony. The sulfides insoluble in ammonium sulfide being dissolved in nitric acid, the active substance may be partially separated from lead by sulphuric acid. On washing lead sulfate with dilute sulphuric acid, most of the active substance entrained with the lead sulphate is dissolved.
>
> The active substance present in solution with bismuth and copper is precipitated completely by ammonia which separates it from copper. Finally the active substance remains with bismuth.
>
> We have not yet found any exact procedure for separating the active substance from bismuth by a wet method. . . .

Re-creating the Curie Experiment to Measure Radioactivity

I asked Paul Frelich, a retired electrical engineer, to work with me to re-create the Curie experiment. Originally, I had hoped we could create the exact experiment used by the Curies, but we had to abandon this idea because of the high cost of quartz. Mr. Frelich was kind enough to think through the problem, and create his own version of the Curie experiment, which readers can try. Here is Paul's summary:

The experiment requires the following equipment: (1) Sample holder, (2) Electrometer, (3) Radioactive source, and (4) Power supply.

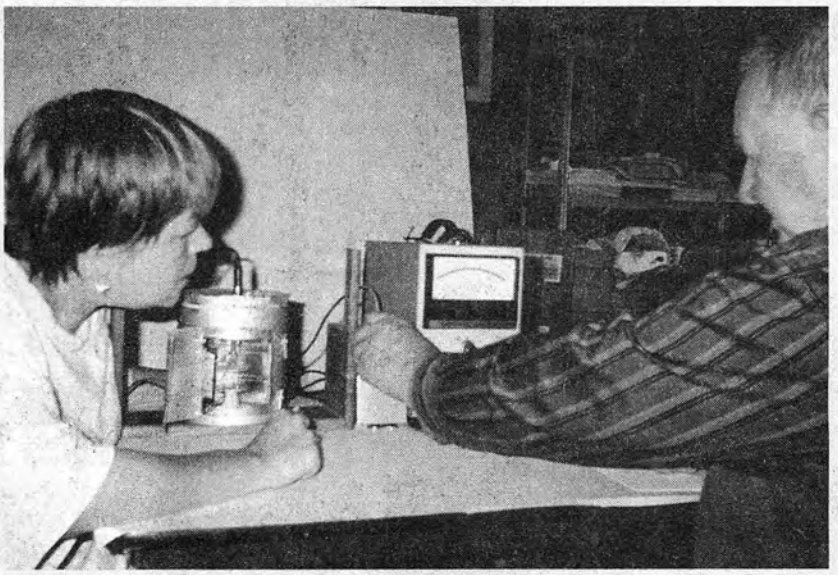
(1) The **sample holder** is a neutralizing capacitor that is used in vacuum tube amplifiers. Two circular plates, each 2 3/16 inch in diameter, are held parallel to each other on ceramic insulators. They can be mounted with the plates either horizontally or vertically oriented, and the spacing between the plates can be varied. One plate is fixed in the assembly, and the other fixed to the end of a long screw, which allows the spacing to be varied from zero to 15/16 of an inch.

In the sample holder shown here, the plates are mounted horizontally. The fixed bottom plate holds the sample, and the upper plate, adjustable in spacing, goes to one pole of the electrometer. A variable potential is applied to the bottom plate.

This neutralizing capacitor assembly is mounted inside a large coffee can, 6 1/16 inch in diameter by 6 1/8 inch high. The can is fitted with a door so that samples can be placed on the bottom capacitor plate.

The purpose of the can is to act as a shield against power line hum, TV, and AM/FM stations, weather radars, and so on. The can is the zero potential reference.

(2) The **electrometer** is a commercial instrument, Keithley Model No. 260 B, capable of measuring very high resistances and very, very low currents. A shielded cable connects the top plate of the sample holder to the electrometer.



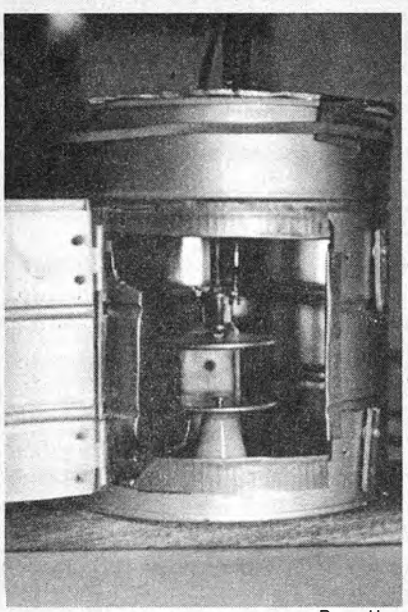
Roger Ham

"My understanding of Curie's work grew enormously, because I simply 'loved' trying to understand that which she discovered." Author Denise Ham with Paul Frelich, who helped her build this capacitor/electrometer hookup for measuring the radioactive emission from the americium in a smoke detector.

(3) **Radioactive source.** A smoke-detector was disassembled to obtain the americium, which is rated as a 10-microcurie source. It seems to be a very thin layer or film on a ring: 1/4 inch in diameter by 1/8 inch thick with a 1/8 inch hole in the center containing a rivet, which was used to hold it in the smoke detector. Only the top thin layer is radioactive; the other material is not.

I also selected some samples of granite from a gravel pile at a local construction site, and some samples from an unpaved roadway on a farm in Vermont. Some of these showed radioactivity, and some did not. One sample showed a strong pulsing activity.

(4) **Power supply.** We originally used a power supply that provided voltages of 0, 10, 25, 75, 300, and 460 volts DC, but this was too heavy to carry around and was dangerous to use at the higher potentials. So, I designed a battery supply that provided 0, and + or – 1.5, 4.5, 9.0, 13.5, and 22.5 volts.



Roger Ham

Closeup of the homemade neutralizing capacitor assembly built inside a coffee can. The sample is placed between the two parallel plates.

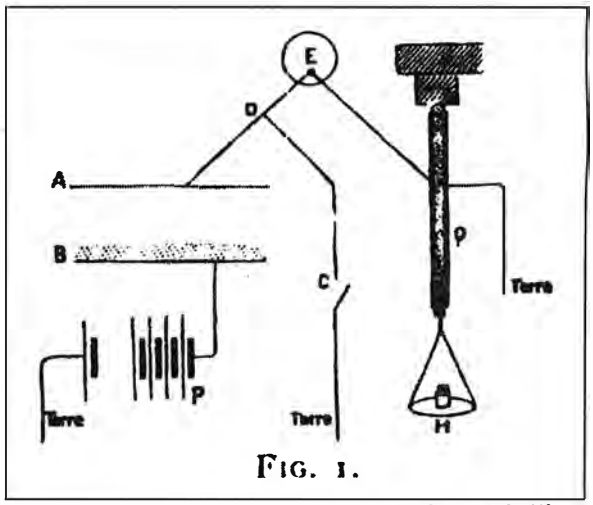


FIG. 1.

M. Curie 1961 [1903], p. 7

Pierre Curie with the quartz piezo-electrometer he invented to measure very slight electrical currents. Later, he and Marie were able to use it to measure radioactivity. Above is a diagram of the piezo-electric device from Marie's thesis. See box (p. 39) for a modern replica of the apparatus.

> Finally, we obtained a substance whose activity is about 400 times greater than that of uranium. . . .
>
> If the existence of this new metal is confirmed, we propose to call it polonium from the name of the country of origin of one of us. . . .

With this first great discovery, Marie paid homage to her native land, with the added irony that Poland did not exist on any world map of that time. Isolating polonium, however, was a herculean feat, as it was tightly fused to bismuth. Eugene Demarcay, a close friend of the Curies, possessed a spectroscope and was able to detect a faint spectral line not known to be any other existing element. In 1910, four years after Pierre's death, Marie, along with André Debierne, was able to accomplish this feat. (It took many years because of polonium's short half-life of 135 days!)

In her 1911 Nobel Prize acceptance speech, Marie Curie explained the difficulties:

> The stumbling block here is the fact that the proportion of polonium in the mineral is about 5,000 times smaller than that of radium. Before theoretical evidence was available from which to forecast this proportion, I had conducted several extremely laborious operations to concentrate polonium and in this way had secured products with very high activity without being able to arrive at definite results, as in the case of radium. The difficulty is heightened by the fact that polonium disintegrates spontaneously, disappearing by half in a period of 140 days. . . .
>
> Recently, in collaboration with Debierne, I undertook to treat several tons of residues from uranium mineral with a view to preparing polonium. Initially conducted in the factory, then in the laboratory, this treatment finally yielded a few milligrams of substance about 50 times more active than an equal weight of pure radium. In the spectrum of the substance, some new lines could be observed which appear attributable to polonium and of which the most important has the wavelength 4170.5 Å. According to the atomic hypothesis of radioactivity, the polonium spectrum should disappear at the same time as the activity and this fact can be confirmed experimentally. . . .

A similar problem had confronted the Curies earlier, in their discovery of radium, which was announced in a scientific paper on December 26, 1898. At that time, the element barium, chemically similar to radium, was the Gordian knot that had to be untied. Pure radium metal was not produced until just before 1911, the which earned Marie her second Nobel Prize, this time for chemistry. Below are a few highlights of the ground-breaking paper produced by the Curies and Gustave Bémont, an associate of Pierre at the School of Physics and Chemistry. It is considered a gem in classic papers on radioactivity:

> The new radioactive substance which we have just found has all the chemical appearance of nearly pure barium: It is not precipitated either by hydrogen sulfide or by ammonium sulfide, nor by ammonia; its sulfate is insoluble in water and in acids; its carbonate is insoluble in water; its chloride, very soluble in water, is insolu-

ble in concentrated hydrochloric acid and in alcohol. Finally this substance gives the easily recognized spectrum of barium.

We believe, nevertheless, that this substance, although constituted in its major part by barium, contains in addition a new element which gives it its radioactivity, and which, in addition, is closely related to barium in its chemical properties.

Here are the reasons which argue for this point of view:

1. Barium and its compounds are not ordinarily radioactive; and one of us has shown that radioactivity appears to be an atomic property, persisting in all the chemical and physical states of the material. From this point of view, the radioactivity of our substance, not being due to barium, must be attributed to another element.

2. The first substance which we obtained had, in the form of a hydrated chloride, a radioactivity 60 times stronger than that of metallic uranium (the radioactive intensity being evaluated by the magnitude of the conductivity of the air in our parallel-plate apparatus). When these chlorides are dissolved in water and partially precipitated by alcohol, the part precipitated is much more active than the part remaining in solution. Basing a procedure on this, one can carry out a series of fractionations, making it possible to obtain chlorides which are more and more active. We have obtained in this manner chlorides having an activity 900 times greater than that of uranium. We have been stopped by lack of material; and, considering the progress of our operations it is to be predicted that the activity would still have increased if we had been able to continue. These facts can be explained by the presence of a radioactive element whose chloride would be less soluble in alcohol and water than that of barium.

3. M. Demarcay has consented to examine the spectrum of our substance with a kindness which we cannot acknowledge too much. . . . Demarcay has found one line in the spectrum which does not seem due to any known element. This line, hardly visible with the chloride enriched 60 times more active than uranium, has become prominent with the chloride enriched by fractionation to an activity 900 times that of uranium. The intensity of this line increases, then, at the same time as the radioactivity; that, we think, is a very serious reason for attributing it to the radioactive part of our substance.

The various reasons which we have enumerated lead us to believe that the new radioactive substance contains a new element to which we propose to give the name of radium.

This announcement was the beginning of a revolution in science. Within just a year of their work, the Curies had discovered two elements, and André Debierne found actinium in the pitchblende sludge. The Curies labored for nearly four more years in producing a tiny bit of radium chloride. The salt was handled by Pierre and Marie, and wrought havoc on their health. Marie's fingertips were burned and cracked. In 1 ton of pitchblende (they worked through about 4 tons under the most primitive conditions), they were able to extract 4 decigrams of radium chloride (about the weight of four postage stamps). Despite the grueling work, they discovered joy and beauty in their results. In her doctoral thesis, completed in 1903, Marie describes the preparation of pure radium chloride:

> The method by which I extracted pure radium chloride from barium chloride containing radium, consists in first subjecting the mixture of the chlorides to fractional crystallization in pure water, then in water to which hydrochloric acid has been added. The difference in solubility of the two chlorides is thus made use of, that of radium being less soluble than that of barium.
>
> At the beginning of the fractionation, pure distilled water is used. The chloride is dissolved, and the solution raised to boiling-point, and allowed to crystallize by cooling in a covered capsule.
>
> Beautiful crystals form at the bottom, and the supernatant, saturated solution is easily decanted. If part of this solution be evaporated to dryness, the chloride obtained is found to be about five times less active than that which has crystallized out. The chloride is thus divided into two portions, A and B, portion A being more active than portion B. The operation is now repeated with each of the chlorides A and B, and in each case two new portions are obtained. When the crystallization is finished, the less active fraction of chloride A is added to the more active fraction of chloride B, these two having approximately the same activity. Thus there are now three portions to undergo afresh the same treatment.
>
> The number of portions is not allowed to increase indefinitely. The activity of the most soluble portion diminishes as the number increases. When its activity becomes inconsiderable, it is withdrawn from the fractionation. When the desired number of fractions has been obtained, fractionation of the least soluble portion is stopped (the richest in radium), and it is withdrawn from the remainder.

Wilhelm Ostwald, a German chemist, once came to visit the Curies after he read about their discovery of radium. He was one of the first men to recognize the importance of what they were doing. The Curies were away on a much needed holiday. Nonetheless, he begged to see their laboratory, and later said:

> It was a cross between a stable and a potato-cellar, and, if I had not seen the worktable with the chemical apparatus, I would have thought it a practical joke [Reid 1974, p. 95].

While Marie worked through ton after ton of pitchblende, eking out the precious bits of radium salt, Pierre worked incessantly on studying the exact nature of radium rays. He passed

the rays of radium through magnetic fields, to see how the magnet could deflect rays, and he watched the effects of the rays on different substances, and on chemical reactions. Pierre had stopped his own research into symmetry, to work beside Marie in her arduous task.

In fact, Pierre was the first to hypothesize radium's value in the treatment of cancer. Pierre also boldly experimented with radium on himself: He deliberately burned himself a number of times and tracked the results. Today, one might look with horror on such a dangerous practice, but in the history of medical science a few hundred years ago, such practice was expected. Think of the early practice of vaccination against disease as such an example. It is not difficult to understand why: The work was extremely difficult, and tedious, and it appears that no one else in the scientific world thought it was important enough to devote themselves so fully to the task.

After more than four years, on March 28, 1902, the Curies took their latest sample of radium salts, weighing about .1 gram, to Eugene Demarcay. The powerful rays at first caused his delicate spectroscope to give faulty readings. Demarcay determined that very little barium remained, and the atomic weight given then was Ra = 225.93. Later, Marie was able to refine the radium even further and establish the atomic weight at Ra = 226.

Kelvin and the British Operation against the Curies

In most "established" accounts about Marie and Pierre Curie, there is usually quite a bit of reference to Lord Kelvin and his correspondence with Pierre. In 1892-1893, Pierre Curie was a scientist of little renown inside France. He was an underpaid, overworked, and very humble man. He had quite a few inventions and discoveries, under his belt, but he intensely disliked the limelight of French science, and he consciously avoided seeking a higher position, awards, or accolades for himself. He thought that science was something to be loved for itself, and for the betterment of his fellow man—which might be the reason that he generated such intense interest from the eye of Lord Kelvin.

William Thomson Kelvin (1824-1907) was a ranking member in the British Royal Society. Most of the biographers paint Lord Kelvin as a benevolent elderly scientist. He ingratiated himself with Pierre in Paris, in 1893, and had Pierre build him a quartz piezo-electroscope device for his own use.

Kelvin was an arrogant prig, who said such things as: "There is nothing new to be discovered in physics now. All that remains is more and more precise measurements." He also made predictions, such as, "Radio has no future," and "wireless [telegraphy] is all very well, but I'd rather send a message by a boy on a pony," and "I can state flatly that heavier than air flying machines are impossible"!

Kelvin also imperiously declared that the Earth was not more than 10 million years old. The discovery of radioactivity demolished Kelvin's claim. In fact, as late as 1906—eight years after the discovery of radium, Kelvin still insisted on the indestructibility of the atom. Ernest Rutherford, who had no use for Kelvin, or his proclamations, heard Kelvin speak about radium and said:

> Lord Kelvin has talked most of the day and I admire his confidence in talking about a subject of which he has taken the trouble to learn so little [Reid 1974, p. 112].

Even the so-called immutable Newtonian Laws of Physics, which Kelvin worshipped as if they were his own, came under attack when Pierre announced that radium spontaneously gave off 100 calories/hour in heat. Kelvin proclaimed that this "radium was getting its energy by absorbing mysterious ethereal waves."

In June 1903, Pierre and Marie were invited to London to receive honors from the British Royal Society, and according to biographer Robert Reid, "no doubt Marie would never have been invited to present her own work in her own right" (p. 123). In fact, after Pierre's untimely death, Kelvin attacked Marie in *The Times* of London on August 9, 1906, deliberately avoiding the more appropriate scientific publications for his broadside, by proclaiming that radium was not an element at all. Undoubtedly, he would not have dared to say such a thing while Pierre was alive.

Kelvin's half-baked theory was based on the legitimate work in disintegration theory done by Rutherford and others that radium gives off inert helium gas. Kelvin's hypothesis held that the element lead, also found among the disintegration by-products of radium, combined with 5 helium atoms—and that was all that radium was. The only reason to take such a theory seriously was that it had the magical name of Kelvin behind it, and was Kelvin's way of attacking Marie's scientific reputation among the uneducated, unscientific world. There was a public battle that emerged from all of this, which not only threatened to ruin Marie's scientific reputation, but also that of any scientist (for example, Rutherford), who did genuine work in understanding radioactive elements.

Marie, who had suffered an enormous emotional blow by the death in 1906 of her beloved husband and scientific companion, was affected by this attack from Kelvin. To prove beyond a shadow of a doubt to everyone in the world that radium was an element, she embarked on another laborious task. Putting all her strength of mind to bear, but this time without Pierre, she labored for almost five years in a tedious process of separating large amounts of radium chloride to produce pure radium metal. Her successful effort captured for her an unprecedented second Nobel Prize, this time for Chemistry.

In her Nobel Acceptance Speech on December 11, 1911, she describes how she, with André Debierne, created radium metal, and she responds to Lord Kelvin:

> Radium has been isolated in the metallic state (M. Curie and A. Debierne 1910). The method used consisted in distilling under very pure hydrogen the amalgam of radium formed by the electrolysis of a chloride solution using a mercury cathode. One decigram only of salt was treated and consequently considerable difficulties were involved. The metal obtained melts at about 700° C, above which temperature it starts to volatilize. It is unstable in the air and decomposes water vigorously.

> The radioactive properties of the metal are exactly the ones that can be forecast on the assumption that the radioactivity of the salts is an atomic property of the radium which is unaffected by the state of combination. It was of real importance to corroborate this point, as misgivings had been voiced by those to whom the atomic hypothesis of radioactivity was still not evident.

A few moments later in her speech, she answered Kelvin and all those who said that radium was merely the combination of other known elements:

> I must remark here that the bold interpretation of the relationship existing between radium and helium rests entirely upon the certitude that radium has the same claim to be a chemical element as have all the other known elements, and that there can be no question of regarding it to be a molecular combination of helium with another element. This shows how fundamental in these circumstances has been the work carried out to prove the chemical individuality of radium, and it can also be seen in what way the hypothesis of the atomic nature of radioactivity and the theory of radioactive transformations have led to the experimental discovery of a first clearly established example of atomic transmutation. This is a fact the significance of which cannot escape anyone, and one which incontestably marks an epoch from the point of view of chemists.

Another scientist who hated Marie Curie, was Sir William Ramsay. He claimed, in a paper he composed in 1913, that it was ***he*** who had done the first good, accurate work on the atomic weight of radium. Marie, in a letter to her friend Ernest Rutherford, accused Ramsay of "malicious and inexact remarks" about her experiments (Quinn 1995, p. 344).

Also, during this period, she and André Debierne worked together to successfully produce a sample of polonium salt, which proved to be 50 times more radioactive than the same amount of radium. In 1910, at the International Congress of Radiology, held in Brussels, Marie was charged with coming up with an international standard for the measurement of radium. Also at this congress, it was decided to call this unit of radioactivity the *curie*—a measurement that would be standard in hospitals all over the world, where radium was being used in treating cancer.

It is probably no accident that it was at this time, in November 1911, when she was revered by people worldwide, for her discoveries, and thought of as an "angel against death," a conqueror of the most dread disease of the ages—cancer—that the most despicable campaign was launched against her personally. She was attacked publicly in the media for allegedly having an affair with her friend and fellow-scientist, Paul Langevin. Langevin, a student of Pierre Curie, a brilliant scientist, would later discover sonar.

Despite the campaign of slander, Langevin and Marie worked together as close associates at the Radium Institute for the rest of her life. (Marie's granddaughter, Hélène, married Paul Langevin's grandson, Michel. Today, Hélène works at the Radium Institute.)

Marie and Pierre Curie with their daughter Irène, in 1904, after the first Nobel Prize.

Nonetheless, the publicity was so intense, that the very day Marie won her second Nobel Prize, this news was blacked out of the French newspapers, while the so-called affair took top billing. The media accused her of being a "harlot," a "foreigner," and a "Polish Jew." (Marie's family was Polish Catholic, not Jewish, but the press was viciously anti-Semitic; these were the same media that had pilloried Captain Dreyfus, whom Pierre Curie had taken up the pen to defend years earlier.) Marie was called a "dull woman," who "used Pierre's discovery" of radium for her own evil designs. Bricks were thrown against her apartment and her windows were broken.

The unremitting campaign to destroy Marie, forced her to leave the country for a year. Bronya came from Poland, as she had after Pierre's death, and comforted her sister. France came very close to losing Marie, as she thought of moving to Poland permanently. Marie never had any use for the media before this series of events; she was even more emphatic in her disgust with them now.

The Years of Trial and Tribulation

France had come very close to losing both Pierre and Marie, during their critical research into radioactive substances, several years before they honored their nation by

winning the Nobel Prize in Physics. The difficulties they faced with the lack of proper laboratory facilities, was compounded by the fact that they were living hand-to-mouth. In 1898, Pierre asked for the chair in Physical Chemistry (Mineralogy), which had become vacant at the Sorbonne. He was known to be the foremost expert in mineralogy in all of Europe. Yet, despite Pierre's vast array of knowledge in the field, the silly politicking among the scientific elite awarded the chair to someone else.

Pierre refused to "play ball" with the establishment. When a scientist was offered an important post, the normal practice was for one to visit all the players, leaving calling cards and gifts. This propitiatory posture was totally repugnant to Pierre. In 1900, the Curies' work with radium and polonium had become well known. Pierre's previous work in crystallography, piezoelectricity, symmetry, and magnetism were also held in high repute. However, all he could obtain was the post of Assistant Professor at the Polytechnique, until he and his wife received a very generous offer from the University of Geneva.

Geneva offered a considerable sum of money, plus a chair for Pierre in physics, coupled with a teaching position for Marie. However, the real temptation was the well-equipped laboratory, plus a second laboratory equipped to Pierre's specifications. They were tempted by this offer, and took a trip to Geneva. In fact, Pierre, at first, accepted the invitation. Pierre's friend, and Marie's teacher, Henri Poincaré, resolved that France would not lose the Curies. Because of Poincaré's influence within the French scientific community, a vacant chair in physics was found at the Sorbonne to counter the Swiss offer, and any obstacles that Pierre might have had were removed by Poincaré.

The result was that France kept the Curies; Pierre was appointed to the newly vacant chair, and Marie was offered a part-time post at the girl's Normal School at Sèvres, teaching physics. No new laboratory came their way, however, and in addition to the posts, came additional responsibilities.

It was a medical pathologist, not a chemist or physicist, who first suggested that the Curies receive a Nobel Prize, and this recognition from the medical community would occur again and again, where Marie was beloved of physicians throughout the world. The pathologist was Charles Bouchard, and his endorsement came in 1901, the first year that a prize in Physics was given. The award was not given until 1903, however, because of the intense politics surrounding giving the award to a woman, or so it appeared. Bouchard was also a foreign member of the Swedish Academy of Sciences, so his nomination of Marie Curie was significant.

It was also necessary to bring in Henri Becquerel as a fellow prize winner, and because the award was not for the discovery of new radioactive substances, there were those who tried to keep Marie's name totally out of the picture. One member of the Swedish Academy of Sciences, Gustav Mittag-Leffler, pushed for the inclusion of Marie. Pierre received a letter from the Nobel Committee on August 6, 1903, telling him that only he had been chosen for the award (Quinn 1995, p. 188). He replied:

> If it is true that one is seriously thinking about me, I very much wish to be considered together with Madame Curie with respect to our research on radioactive bodies. . . . Don't you think it would be more satisfying, from an artistic point of view, if we were to be associated in this manner?

Once again the Academy met, and because of Bouchard's 1901 endorsement, the legal loophole was satisfied, and those who wanted Marie to be part of receiving the award, had the necessary papers to push their cause. Three weeks after Pierre's letter was received, the Nobel Committee decided to give the Prize to both Curies and Becquerel, for "their joint researches on the radiation phenomena."

Marie Curie thus became the first woman to win a Nobel Prize. Despite all the publicity that the award generated, the Curies still did not have access to any new facilities to continue their research. The publicity was decidedly unwanted by the Curies, as they were the subject of continual harassment by the media to give "personal" interviews. They also refused to patent anything connected with their researches into radioactivity, which would have made them very rich people. Simply put, both Pierre and Marie, sincerely believed that their discovery belonged to all of humanity.

Eve Denise Curie, their second child, was born on December 6, 1905, and their family now also included Pierre's elderly widowed father, Dr. Eugène Curie. Dr. Curie loved his grandchildren, and took special care of them when Marie and Pierre were busy teaching, or in the laboratory. Eve recalls her grandfather tenderly: "He had me read many things, memorize poetry of which I understood only half the meaning but of which I felt the beauty. As a result I have always loved poetry very much."

Pierre's Death

On April 19, 1906, Pierre Curie died in a traffic accident. He slipped beneath the wheels of a heavy horse-drawn wagon and was crushed. His death was the most painful experience that Marie Curie would ever know. She was now deprived of her best friend, scientific colleague, and loving husband.

Marie's diary, which was made available to researchers only over the past 10 years, makes plain the extreme sorrow from which she suffered, but Marie was intensely private, and hated melodrama. She suffered alone, and expressed her sorrow only to her sister Bronya, who had come from Poland to be with her. Fifteen years later, Marie Curie was asked to write the biography of her husband. I have excerpted some fragments from her sublime tribute to him:

> I shall not attempt to describe the grief of the family left by Pierre Curie. . . . He was, too, a devoted father, tender in his love for his children, and happy to occupy himself with them. . . .
>
> The news of the catastrophe caused veritable consternation in the scientific world of France, as well as in that of other countries. . . . One of the glories of France had been extinguished. . . .
>
> To honor the memory of Pierre Curie, the French Society of Physics decided to issue a complete publication of his works . . . [which] comprises but a single vol-

Marie with her daughters, Eve and Irène, two years after her husband's death.

ume of about 600 pages, which appeared in 1908, and for which I wrote the preface. One finds in it great richness of ideas and of experimental facts leading to clear and well-established results . . . one might even say classical, in form. . . .

Believing only in the pacific might of science and reason, he lived for the search of truth. . . . Detached from every common passion, seeking neither supremacy nor honors, he had no enemies. . . . [H]e was able to exercise a profound influence merely by the radiation of his inner strength. It is useful to learn how much sacrifice such a life represents. The life of a great scientist in his laboratory is not, as many think, a peaceful idyll. More often it is a bitter battle with things, with one's surroundings, and above all with oneself. A great discovery does not leap completely achieved from the brain of the scientist, as Minerva sprang, all panoplied, from the head of Jupiter; it is the fruit of accumulated preliminary work. Between days of fecund productivity are inserted days of uncertainty when nothing seems to succeed, and when even matter itself seems hostile; and it is then that one must hold out against discouragement. Thus without ever forsaking his inexhaustible patience, Pierre Curie used sometimes to say to me: "It is nevertheless hard, this life that we have chosen. . . . Our society, in which reigns an eager desire for riches and luxury, does not understand the value of science. It does not realize that science is a most precious part of its moral patrimony. Nor does it take sufficient cognizance of the fact that science is at the base of all progress that lightens the burden of life and lessens its suffering. . . ."

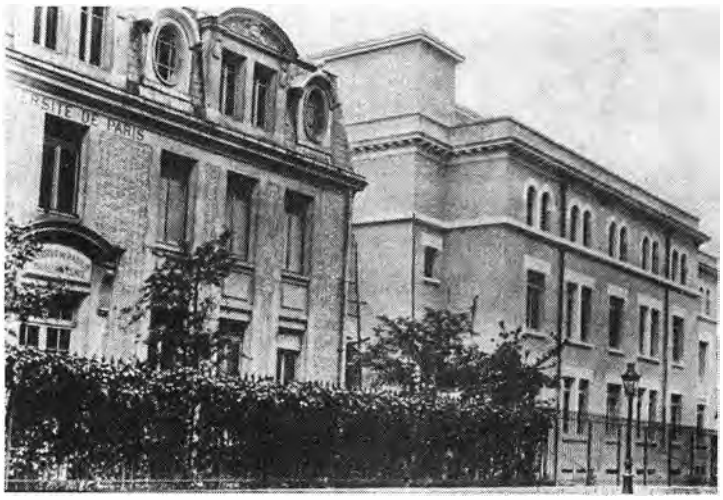
I have wished above all, in gathering together here these few memories, in a bouquet reverently placed upon his tomb, to help, if I can, to fix the image of a man truly great in character and in thought, a wonderful representative of genius of our race. Entirely unfranchised from ancient servitudes, and passionately loving reason and clarity, he was an example "as is a prophet inspired by truths of the future" of what may be realized in moral beauty and goodness by a free and upright spirit, of constant courage, and of mental honesty which made him repulse what he did not understand, and place his life in accord with this dream.

Marie was asked to take Pierre's chair at the Sorbonne. This was an epoch-making event, as she became the first woman in its more than 600-year history to teach there. The amphitheater where she gave her first lesson was packed with reporters, students, professors, and celebrities from the world over. Many expected her to preface her lecture with a tearful tribute to her dead husband. Instead she entered to sustained applause, and simply began her lecture at exactly the point that Pierre had stopped his last lecture. Her sublimity took many by surprise, and it is reported that women and men were drawn to tears by her presence.

The French government offered her a significant annual pension as Pierre's widow, which she refused. She stated that she was 38 years old, healthy, and could work. What Marie really desired was to have a laboratory to continue her work.

During this time, Marie also set up an experimental school, for her daughter and for the children of her close scientific colleagues. Each scientist took turns teaching his specialty, and, as was the case for the Sklodowski children, pedagogy was stressed. The young children quickly mastered scientific subjects, under the elite tutelage. They worked in laboratories along with the parents of their peers, did experiments that most children were able to do only when they reached college. Music was stressed, along with poetry and languages. Marie also saw to it, that a good deal of free time was provided, and that there was plenty of outside exercise, walks, nature observing, and play. Her young daughter, Irène, was able to blossom under such conditions. Eve, although only four years old, began playing the piano, and her mother remarked on more than one occasion that she played with the "understanding" and emotion of an adult.

In 1909, the dream of a laboratory began to take flesh, and not just "a" laboratory, but what would become known as the *Institut du Radium,* the Radium Institute. Another physician, Emile Roux, a champion of Marie, had the idea to create a laboratory under the auspices of the Pasteur Institute, of which he was the head. When this was made public, the Sorbonne decided that it should also support the funding of such an Institute. The idea was to have two main laboratories: one for



The Radium Institute in Paris, completed in 1914, which today has a staff of 1,400 workers.

biology and cancer research, which would be under the auspices of the Pasteur Institute, and the other focussing on the physics and chemistry of radioactive substances, in particular, radium. The latter would be named the Pavilion Curie, in honor of Pierre.

Marie took a direct, active approach, along side the architects, in designing the Radium Institute. When it was finally finished, the words "Institut du Radium, Pavillion Curie" were cut into stone at the entrance. In Eve Curie's biography of her mother, she writes that Marie evoked the beautiful words of Louis Pasteur on the occasion (p. 287):

> If conquests useful to humanity touch your heart, if you stand amazed before the surprising effects of electric telegraphy, the daguerrotype, anesthesia and so many other admirable discoveries: if you are jealous of the part your country can claim in the further flowering of these wonders, take an interest, I urge upon you, in those holy dwellings to which the expressive name of laboratories is given. Ask that they be multiplied and adorned. They are the temples of the future, of wealth and well-being. It is there that humanity grows bigger, strengthens, and betters itself. It learns there to read in the works of nature, works of progress and universal harmony, whereas its own works are too often those of barbarity, fanaticism, and destruction.

Marie planted a garden of rambler roses. Not afraid of physical work, she used the spade, dug up the area, planted trees, and watered them. She was particularly insistent on the idea of aesthetics, and made sure the building was bright, the windows large. Her ardent desire was to create a "beautiful" living space, where people would love to work, a place where, long after she died, people would enjoy its surroundings.

Marie took personal care in every matter regarding the Institute, including the hiring of researchers, and the acceptance of students. She was generous almost to a fault. If a colleague recommended someone, she accepted him or her, without hesitation. She also made sure that women were accepted, as well as foreigners. She personally provided the money for scholarships to poor Polish students to work there. Jonathan Tennenbaum writes in his book, *Nuclear Energy: The Feminine Technology:*

> In this project, [Pasteur Institute director Emile] Roux saw a continuation of the great tradition of Louis Pasteur, who, as a physicist and chemist, introduced a revolution into medicine. The discoveries of Marie and Pierre Curie had cracked open a further, entirely new chapter in science that in the first years already led to a breakthrough in cancer treatment. Particularly fortunate in conjunction with this was the fact that Marie knew how to excellently combine the theoretical with the practical, and in addition possessed an intense personal interest in biology and medicine. . . .
>
> Originally there were places for 50 co-workers. Today the Radium Institute on Rue Pierre et Marie Curie has become a huge complex, with about 1,400 employees. The original buildings are still utilized; in one is found the Curie Museum with the laboratory of Marie Curie and an archive. There one is able to examine the list of the collaborators and visitors over the course of the years. Striking is the great number of women who came to Paris from all corners of the globe in between the two World Wars in order to carry out an "atomic laboratory course" with Marie Curie.
>
> The collaboration between physics, chemistry, biology, and medicine striven after by Roux has proved to be extraordinarily fruitful. It would soon become clear that the Curie Therapy was only the very beginning; the application of radioactive substances permitted researchers and medical doctors to observe and to document living processes in ways that no one had heretofore ever dreamed to have been possible [translated from the German by Edward Carl].

World War I: The Mission to Save Lives

The Radium Institute was barely completed in July 1914, when, on August 1, the French announced the mobilization for war. Marie was vacationing off the coast of Brittany with her children that day, and knew that war was imminent. She left her children in the care of her house-servants and Polish nannies, and went back to Paris. At stake was the precious radium in the Institute's laboratory. While people were fleeing Paris in droves, Marie was making her way back to the city, to make arrangements to personally transport and secure the radium in a bank vault in Bordeaux. But that was not all. Knowing that the nation was thrust into war, she decided to give of herself to her adopted country.

Although many thought that it would be a short war, Marie sensed that the war would be long and brutal. She was proven right. The first casualty reports were 850,000 French killed, wounded, or captured, and 675,000 on the German side. Marie gave her earnings from her Second Nobel Prize, which was in a Swedish bank account, and bought French war bonds

to help her country. Eve Curie also reported that Marie offered to give all of her gold medals to the government, to melt them down, but the Bank of France refused to do this. Throughout her life, when she had money, Marie gave generously to Polish aid, national aid, for soldiers, for the poor, and for many other causes.

If the French army had had their way, Marie Curie would not have served her country. When she went to them and proposed her idea of deploying X-ray equipment on the front, they dismissed her; they were so bogged down in fighting, they simply didn't care.

Marie had gotten her idea from a radiologist, Dr. Henri Béclerè, and she was determined to make X-ray equipment the norm on the battlefield. She did some hospital work with Dr. Béclerè, and learned the rudiments of X-ray examination. During this time she visited Red Cross hospitals around Paris, and saw that there was an appalling lack of equipment and personnel. Of course, there was the additional problem, that "at the front" there was no electrical source available to use the X-rays. She thought the problem through and came upon the "radiology car." She put together the car and the equipment, after having found benefactors who would give up their automobiles for that purpose. Among the equipment she had to scavenge for the job are:

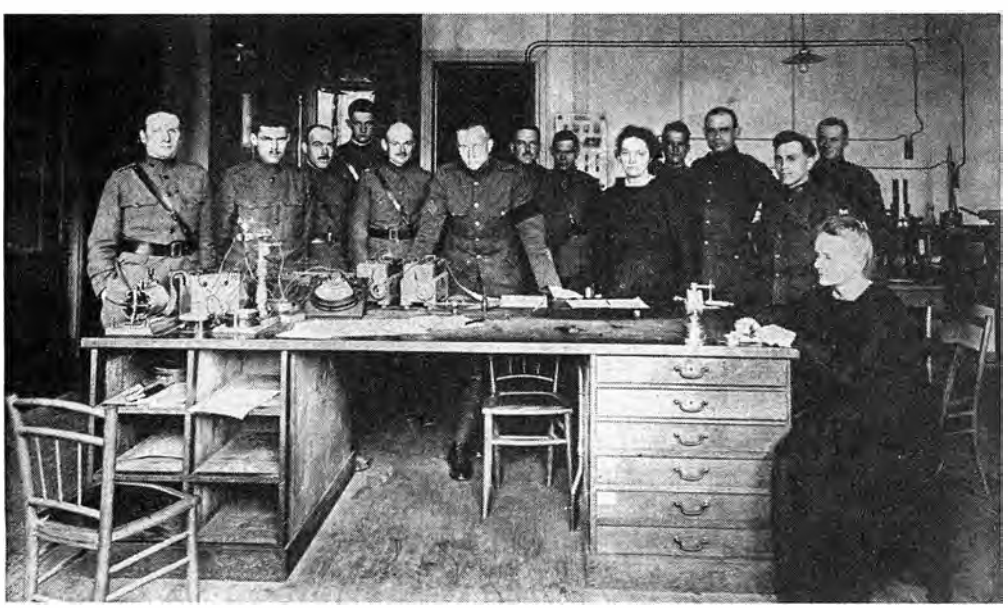
> equipment for converting the electricity available on site into the power required, along with several glass vacuum tubes through which the electrical charge would be fired to produce X-rays; a lightweight table on which to lay the patient; a rolling rack for the glass vacuum tube, or ampoule, so that it could be easily moved to the area being examined; a small number of photographic plates and supplies, a screen for radioscopy; curtains to produce darkness at the site; an apron and other material for protecting the operator; and some insulated cable and a few other tools [Quinn 1995, p. 362].

The weight of all the equipment, according to Marie Curie's postwar book on the subject, would come to about 500 pounds. Then there was the problem of electricity. Marie also learned how to maintain and fix the X-ray equipment. She got a driver's license and learned how to fix the car, if needed. Still, the idea of having this equipment made available to surgeons on the front lines was thought absurd, a nuisance, and too dangerous a job for a woman. But Marie was ever conscious of the great numbers of men who were dying, unnecessarily, at the front, because of lack of the proper diagnostic equipment. In her mind, it was criminal to allow this to go on.

From one part of the military bureaucracy to the next, back and forth, she appealed the case, and finally, in late October 1914, she received permission to take her X-ray car to the front. Irène wrote incessantly to her mother, asking to be allowed to come to Paris, and to work alongside her. Marie promised Irène that she could, but only after she was sure that Paris was secure (Paris was bombed in early September). On September 6, 1914, Marie wrote to Irène:

> . . . [T]he theater of war is changing at the moment;

Marie Curie at the wheel of her first mobile radiation unit, which she drove to battlefront hospitals. She mobilized more than 200 of these X-ray cars during the war.



Marie Curie, Irène Curie (standing at right), and students from the U.S. Expeditionary Corps at the Radium Institute in Paris, 1919.

> the enemy seems to be going farther away from Paris. We are all hopeful, and we have faith in the final success. . . . Make young Fernand Chavannes do his problems in physics. If you cannot work for France just now, work for its future. Many people will be gone, alas, after this war, and their places must be taken. Do your mathematics and physics as well as you can [Eve Curie 1937, p. 294].

Both Irène, and little Eve, who was barely 11 years old, missed their mother, who was determined to save the lives of the soldiers. But Irène finally got her wish, and joined Marie when they drove their X-ray car to the front lines on November 1. Irène had taken a crash course in nursing a few weeks before, and passed. Incredibly, despite the fact that Irène worked incessantly during the entire war, she also managed to obtain her certificates from the Sorbonne, "with distinction" in Mathematics (1915), in Physics (1916), and in Chemistry (1917).

Irène was an indispensable help to Marie, both emotionally and scientifically. She very quickly learned the skills to be able to "teach" doctors, who were more than twice her age. Her sister wrote that

> At one hospital she sat down and delivered a brief lesson in elementary geometry to a Belgian doctor who had failed to understand the principles of locating projectiles in the body with the use of radiographs [Eve Curie 1937, p. 235].

Finally together, Marie and Irène, along with a mechanic and chauffeur, went to an Army evacuation hospital at Creil, just behind the front line at Compiegne. This was the first victory in her battle with the military, as Marie fought for the right to be at the front lines all the time.

Another member of the Curie family was also present during this time, Maurice Curie, the son of Pierre's brother, Jacques. Maurice spent a year in the most dangerous area of the war, Verdun. Marie was afraid for her nephew, and tried to get him reassigned, but he would have none of that. However, as is the case with war, especially the World War I, Maurice became disgusted with the war, particularly with the leadership. He spent month after month confined to trenches, cold and wet, covered with vermin, with little to eat, and frequent tear gassing. In June 1915, Maurice wrote that he was:

> very tired, with a touch of low spirits. . . . I had had more than two months in the trenches in deep winter, and confess that I have a certain apprehension about the new campaign, of which the evidence is palpable [Quinn 1995, p. 372].

By the spring of 1917, the situation had grown so grim that French soldiers were committing acts of insubordination, in protest of the leadership. Marie was saddened by the human carnage she witnessed, as she saw France's young manhood, with so much promise and potential for good in the future, being destroyed. She was particularly saddened, that so many university students were slaughtered. One youth, Jean Danysz, was a Polish-French Second Lieutenant, and the son of a great biologist who worked with Louis Pasteur. Jean had helped Marie with one of her first radiology cars, and was doing important work on beta rays, which was so impressive that he was offered a position in the United States. But he died in the first year of the war. By the war's end, 1,375,800 Frenchmen had perished.

Despite the death and destruction, one important advance was accomplished by the doctors and by Marie Curie: Hundreds of young women were trained in radiological science. Dr. Béclerè trained 300 physicians at the Val de Grace Hospital, and Marie directed a course to teach young women to become proficient as radiological technicians at the Radium Institute. Some of the women were nurses, who trained under her, but many were ordinary unskilled young ladies, who wanted to help their country. Some of the women were maids, some were the rich women they served. They all participated in a rigorous course, designed by Marie. Over this two-year period, she gave a basic education in elementary mathematics, physics, and anatomy to 150 young women, who were then sent to staff the hospitals near the front. By the war's end, Marie had put more than 200 X-ray cars into service and had fought to have more hospitals near the front, which were staffed by trained nurses and technicians. Between 1917 and 1918 alone, 1,100,000 men were treated through these radiological posts.

At the war's end, Marie published *Radiologie et la Guerre* (Radiology and War), praising the work of these young women. Marie later described an occasion where a female assistant radiologist

> who had only been in the hospital a short time, located the position of a piece of shrapnel which had passed through, and crushed the femur of a man's thigh. The surgeon . . . did not want to probe for the shrapnel from the side from which the radiologist indicated it was accessible; instead, he probed from the open wound side. Finding nothing, he decided to explore the region indicated by the radiological examination and immediately extracted the shrapnel [Eve Curie 1937, p. 234].

The woman, who went unnamed in this section of Marie's *Radiology and War* was Irène. Marie did not mention Irène, by name, once in her book, nor did she need to; she brought Irène into the Radium Institute where the two worked together for the rest of Marie's life. Later, Marie saw her daughter marry another brilliant young student, Frédéric Joliot. In 1935, one year after Marie's death, Frédéric and Irène Joliot-Curie won the Nobel Prize in Physics, for the discovery of artificial radioactivity.

Part III

Marie Curie and the Physicians of America

On May 20, 1921, the East Room of the White House was filled with more than 100 important scientists and diplomats from Poland and France. U.S. President Warren Harding had the honor of presenting Marie Sklodowska Curie with a key inscribed with the following words: "From the Women of

Library of Congress

Marie Curie with President Warren Harding at the White House in 1921: "We greet you as foremost among scientists in the age of science."

America" to Madame Marie Curie. The elaborate key was to open a ribbon-draped cabinet, which contained one gram of radium, worth more than $100,000, which was paid for by America's women. His inspiring speech paid great homage to Madam Curie, and expressed profound respect for both her adopted nation, France, and the newly re-created nation of Poland, the land of her birth, which had finally become an independent nation again, after the war:

> On behalf of the American nation, I greet you and welcome you to our country, in which you will everywhere find the most cordial possible reception. We welcome you as an adopted daughter of France, our earliest supporter among the great nations. We greet you as a native-born daughter of Poland; newest, as it is also among nations, and always bound by ties of closest sympathy to our own Republic. In you we see the representative of Poland restored and reinstated to its rightful place, of France valiantly maintained in the high estate which has ever been its right.
>
> We greet you as foremost among scientists in the age of science, as leader among women in the generation which sees woman come tardily into her own. We greet you as an exemplar of liberty's victories in the generation wherein liberty has won her crown of glory. In doing honor to you we testify anew our pride in the ancient friendships which have bound us to both the country of your adoption and that of your nativity.
>
> It has been your fortune, Madam Curie, to accomplish an immortal work for humanity. We bring to you the meed of honor which is due to pre-eminence in science, scholarship, research, and humanitarianism. But with it all we bring something more. We lay at your feet the testimony of that love which all the generations of men have been wont to bestow upon the noble woman, the unselfish wife, the devoted mother. If, indeed, these simpler and commoner relations of life could not keep you from attainments in the realms of science and intellect, it is also true that the zeal, ambition and unswerving purpose of a lofty career could not bar you from splendidly doing all the plain but worthy tasks which fall to every woman's lot.
>
> A number of years ago, a reader of one of your earlier works on radioactive substances noted the observation that there was much divergence of opinion as to whether the energy of radioactive substances is created within those substances themselves, or is gathered to them from outside sources and then diffused from them. The question suggested an answer which is doubtless hopelessly unscientific. I have liked to believe in an analogy between the spiritual and the physical world. I have been very sure that that which I may call the radioactive soul, or spirit, or intellect—call it what you choose—must first gather to itself, from its surroundings, the power that it afterwards radiates in beneficence to those near it. I believe it is the sum of many inspirations, borne in on great souls, which enables them to warm, to scintillate, to radiate, to illumine, and serve those about them.
>
> Let me press the analogy a little further. The world today is appealing to its statesmen, its sociologists, its humanitarians, and its religious leaders for solution of appalling problems. I want to hope that the power and universality of that appeal will inspire strong, devout, consecrated men and women to seek out the solution, and, in the light of their wisdom, to carry it to all mankind. I have faith to believe that precisely that will happen; and in your own career of fine achievement I find heartening justification for my faith.
>
> In testimony of the affection of the American people, of their confidence in your scientific work, and of their earnest wish that your genius and energy may receive all encouragement to carry forward your efforts for the advance of science and conquest of disease, I have been commissioned to present to you this little phial of radium. To you we owe our knowledge and possession of it, and so to you we give it, confident that in your possession it will be the means further to unveil the fascinating secrets of nature, to widen the field of useful knowledge, to alleviate suffering among the children of man. It betokens the affection of one great people to another [*The New York Times,* May 21, 1921].

After President Harding's speech, Madame Marie Sklodowska Curie responded:

> I can not express to you the emotion which fills my heart in this moment. You, the chief of this great Republic of the United States, honor me as no woman has ever been honored in America before. The destiny of a nation whose women can do what your countrywomen do today through you, Mr. President, is sure and safe. It gives me confidence in the destiny of democracy. I accept this rare gift, Mr. President, with the hope that I may make it serve mankind. I thank your countrywomen in the name of France. I thank them in the name of humanity which we all wish so much to make happier. I love you all, my American friends, very much *Science* 1921, p. 497].

The Curies with Missy Meloney (left) in America in 1921. Inset is the front page of Missy's magazine The Delineator, April 1921, where the fund-raising for the gift of radium is publicized on the cover.

THE DELINEATOR

VOLUME XCVIII APRIL 1921 NUMBER THREE

Mrs. WILLIAM BROWN MELONEY Editor

JAMES LAYTON TOWER, Managing Editor

THAT MILLIONS SHALL NOT DIE!

EVERY little while a man or a woman is born to serve in some big way, and such a one is Marie Curie, the discoverer of radium, whose story THE DELINEATOR publishes this month. Madame Curie is not only great because of her contribution to science, but because of the spirit in which she bestowed her gift upon the world. When the editor of THE DELINEATOR sought Madame Curie in Paris it was only with the idea of securing an article for the two million women who read THE DELINEATOR.

A woman's magazine should be an institution of service, and the editor of THE DELINEATOR saw an opportunity for real service, not merely to the great cause, but to mankind and particularly to woman-kind, many of whose physical ills may be solved

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Among the scientists in America who are supporting this undertaking and who will receive Madame Curie when she arrives in this country are:

Dr. F. C. Wood of the Crocker Memorial Cancer-Research Laboratory; Dr. Will J. Mayo, President of the American Medical Association; Dr. Duane of Harvard; Dr. Robert Abbe of New York, who was the first surgeon in this country to work with radium; Dr. William Taylor of Philadelphia, president of the Medical College of the University of Pennsylvania; Dr. James Ewing of Cornell University; Professor Pegram of Columbia University; Dr. Cattell and Dr. Simon Flexner of the Rockefeller Institute; Dr. Greenough of Harvard; Dr. Taussig and Dr. Franklin H. Martin.

The small group of women who have formed the

Columbia University Library

After the trip to the United States was a momentous occasion, not only for Marie Curie, but for the American people themselves. The hospitality and generosity shown to Madam Curie went far beyond a simple fund-raising campaign. In each place she visited, from New York City, to Buffalo, to Chicago, and many other cities, the American people treated her with a respect and dignity usually reserved for heads of state. In some ways, the campaign to raise money to buy Marie Curie a gram of radium, was similar to the great fund-raising campaign in America to build a base for the Statue of Liberty, a gift given by the French nation.

The person responsible for orchestrating this "event," which took Marie all over America to be honored, was an American editor of a popular woman's magazine, *The Delineator*. The woman was a small, dynamic individual named Marie Mattingly Meloney, who wanted everyone to call her "Missy."

Missy had a somewhat unique background. Her father was a doctor, and her mother, his third wife, taught newly freed black slaves in the South. *The Delineator* featured the latest women's fashion, and articles on how to take care of home and family. Missy had tried unsuccessfully, for quite some time, to get a story on Marie Curie, but every time she sent a journalist to Paris, Marie refused to see him. Marie Curie had no use for the media, and had viewed them disdainfully ever since the early days of her discovery of new radioactive elements. Many had tried to penetrate the private life of Marie and Pierre. None had been permitted to speak with her.

In mid-1920, Missy travelled to Paris, determined to speak with Madam Curie herself. Missy was not one to take "no" for an answer, but that was the first answer she got. Undeterred, Missy visited the French author Henri-Pierre Roche (the author of the novel *Jules et Jim*), and asked him to intercede to get Marie to talk to her. Roche was impressed by Missy's genuine enthusiasm, and thought that it would be important for Marie to meet her. Marie agreed to talk to her for a few minutes only, and that encounter led to their lifelong friendship.

When Missy asked Marie what she could do to "help" her, Marie told her that she had no radium to experiment with. After the end of the war, France was depleted of both manpower and money. Although the Radium Institute was built, there was no money forthcoming to equip it properly. The radium which Marie had safe-guarded in Bordeaux during the war was all that France had—1 gram—and that was used, primarily, in the biological section to provide radon tubes for cancer therapy. Marie told Missy that the United States had the world's most plentiful supply, 50 grams.

Missy immediately began to think about what a great good it would be for America to give one of those grams to Marie, and she calculated the cost at about $100,000 per gram (in 1920 dollars). She saw an opportunity before her: Instead of simply getting a "story" for her magazine, she would use her influence, contacts, and clout in a noble cause: The women of America would give Marie Curie a gram of radium. She wanted Marie's plight to generate a response from the American people, and went back to the United States to start the campaign. Initially, however, she thought she might be able to raise $10,000 each from 10 women, but soon discovered that was impossible.

Missy herself became the chairman of the "Marie Curie Radium Fund," and she contacted prominent medical people in New York to ask them to become part of the board. She discovered that she had no problem getting help from American

doctors. Marie Curie's name was highly respected among the medical profession in the United States. During the war, Marie had single-handedly educated scores of U.S. physicians at the Radium Institute in X-ray technology, and had enjoyed the Americans' "brash" sense of "we can do anything" that Americans were so famous for at the time.

One of the doctors who immediately joined the board, Robert Abbe, had been experimenting, and using radium therapy for years. He had visited the Curies as early as 1902 in Paris, and had been the first American doctor to use radium in treating cancer and other diseases. Although radiation therapy was still in its infancy, by the year 1920, the year of Missy's visit to Paris, it held out promising hopes to millions of people worldwide.

Other prominent men and women were recruited to sit on the board, including Mrs. John D. Rockefeller, Mrs. Calvin Coolidge, Mrs Robert Mead (the founder of the American Society for the Control of Cancer), and other women with time and money. The advisory committee of scientists included the President of the American Medical Association, and leading representatives from the Rockefeller Foundation, and Harvard, Cornell, and Columbia universities.

Missy used the pages of *The Delineator* as the public solicitor to encourage American women to give what money they had. Young college women took up collections to give to the fund, as did little girls who found out about the campaign, sending in their nickels and dimes. Marie Curie had been receiving letters from all over America for many years from cancer sufferers, who had had their cancer "cured" by enterprising doctors, like Dr. Abbe. One woman, the first to be treated at the hospital in Gettysburg, Pennsylvania, wrote to Marie about her radium treatment: "What it done for me none but God can tell." Madam Curie received letters like this all the time; she was always moved by what people said to her, and she answered the letters when she could.

Perhaps the finest expression of appreciation to Marie Curie, however, was from the American doctors. Those on the board took it as their personal responsibility to ensure that the campaign to raise the $100,000 was more than a success. They wanted not only to buy the gram of radium, but also to ensure that Madam Curie had a modern, well-equipped laboratory. In each city where Marie Curie was to visit, a fund-raising quota-system was set up: New York had a quota of $10,000; Boston and Philadelphia each had a quota of $5,000. Each doctor on the board participated. Dr. Abbe, for example, wrote to Dr. John G. Clark of Philadelphia (both of them were members of the prestigious Philadelphia College of Physicians): "I have by personal appeal to my patients raised over 20,000 dollars myself. . . ."

Dr. Robert Abbe

Abbe was also an avid collector of medical "treasures" belonging to famous medical scientists. At the College of Physicians in Philadelphia, there is a beautiful display in a glass cabinet, in a grand drawing room. It was a gift from Dr. Abbe to the College, and it contains portraits, illustrations, autographed letters, and biographical notes of five medical men, who Dr. Abbe thought had made the most significant contributions to medical science: Benjamin Rush, Edward Jenner, Joseph Lister, Louis Pasteur, and Marie Curie.

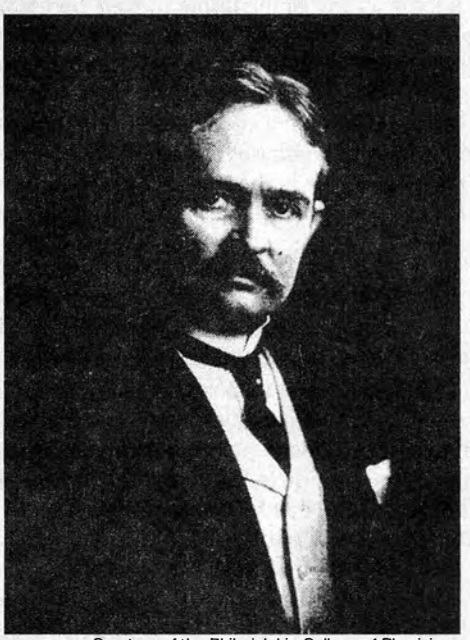
Dr. Robert Abbe: U.S. Champion of the Curies

Robert Abbe was born in New York City, April 13, 1851, and died in March 1928. He graduated from the College of City of New York in 1870, and early in his career, he taught drawing and geometry at his alma mater. After graduating with a medical degree in 1874 from the College of Physicians and Surgeons, he became an intern at St. Luke's Hospital in New York.

Abbe was said to be one of the finest surgeons in New York, with an "irreproachable technique," and he became a pioneer in surgical work in gastro-intestinal tract, as well as cerebral, spinal, and plastic surgery. He loved classical art, and it influenced his method of surgery. He was one of the best plastic surgeons in the United States, and did work with severely deformed persons. He also devised "the earliest and possibly the best method of treating impassable strictures of the esophagus."

While he was at New York's Babies & Roosevelt Hospital, Abbe did considerable research on X-rays and corresponded with the Curies. He was a consulting surgeon to other large hospitals, and he wrote numerous scientific papers.

Abbe had six siblings, and one of them, Cleveland Abbe, became the first full-time meteorologist in the United States. While Cleveland Abbe was interested in Oriental archeology, Robert's passion was prehistoric artifacts found at Mount Desert Island, Bar Harbor, Maine, where he had a summer home. Today, there is a museum there with Abbe's collection, which also includes his drawings.



Courtesy of the Philadelphia College of Physicians

Dr. Robert Abbe (1851-1928)

The cabinet showcases the following items, along with a quotation from each individual:

• Rush's gold watch, and his quote: "I make everyone whom I meet contribute to my improvement."

•Jenner's inkstand and a lock of hair, and his quote: "I am not surprised that men are not thankful to me, but I wonder that they are not more grateful to God for the good which He has made me the instrument of conveying to my fellow creatures."

• Lister's case of instruments, and original test tubes used in tests for lactic fermentation, with the words: "The scientist's public life lies in the work that is His."

• Next to Pasteur's hand-made model of a tartrate crystal is his quote: "Opportunity comes to him who is prepared."

• Finally, prominently placed in the center of this exquisite cabinet, is one of the original quartz piezo-electroscope built by Pierre Curie, and used by the Curies in their discovery of new radioactive substances. Alongside it are her simple words: "I desire only to teach."

Dr. Abbe considered Marie's gift the crowning achievement for the display. She wrote him on March 1, 1921:

> It gives me great pleasure to present this quartz piezo-electroscope for such purpose as its historical interest will serve. It was designed by Professor Curie and is one of those used by us in our early research work for measuring the radioactivity of radium. Having served its purpose it was replaced by other apparatus.

When he finally received the long-awaited gift, on April 25, 1921 he wrote: "The dear instrument, my muse says must be quite homesick tonight. But it must know it is among friends. . . . [E]verybody thinks the College of Physicians is in great luck."

Abbe was one of the prime movers behind the fund-raising done by the physicians, and as early as Christmas Day, 1920, he wrote to Dr. Taylor, about Marie's visit to America:

> It is hoped that a considerable sum of money may be given her to purchase radium in this country for her own personal use in further(ing the) study of medicine. . . . I believe America will honor her and give her what she needs."

By April 30, Abbe wrote to a Dr. Taylor: "Our fund is coming on finely. Don't mention it please, but we are up to the 100,000 mark now and going on we ought to have a nice purse for equipment for Madam Curie."

Abbe, who wrote many scientific papers on the use of radium in surgery, always paid homage to the Curies for their discovery. In an article published in the August 15, 1914, *Medical Record,* titled: "Present Estimation of Value of Radium in Surgery," he wrote:

> Into nature's rocks, by the most artful exhibition of scientific detective work, Madam Curie pursued this unknown substance and dragged it forth . . . to reveal the hidden mysteries of physical force and touch human interests in the control of some diseases.
>
> In itself radium illustrates in concentrated form the universal process of change and decay of matter
>
> Its enormous energy is like incorporated life and its electrons like imprisoned life released. . . .
>
> Until we know why cells grow, and what innate power resides in living tissue which compels growth and orderly change in living cells, and until we know why the disorderly and exaggerated overgrowth of the cells forms life-destroying tumors, we will not be likely to know what that influence is, which is shot into the cells by the atoms of radium which reduces them to orderly growth. . . .
>
> Radium is an asset of permanent value to surgery in the treatment of those diseases. . . [cancer]. [T]he real truth [is] that as an agent for the relief of human suffering radium has proved to be a weapon of unique value in the surgeon's hands.

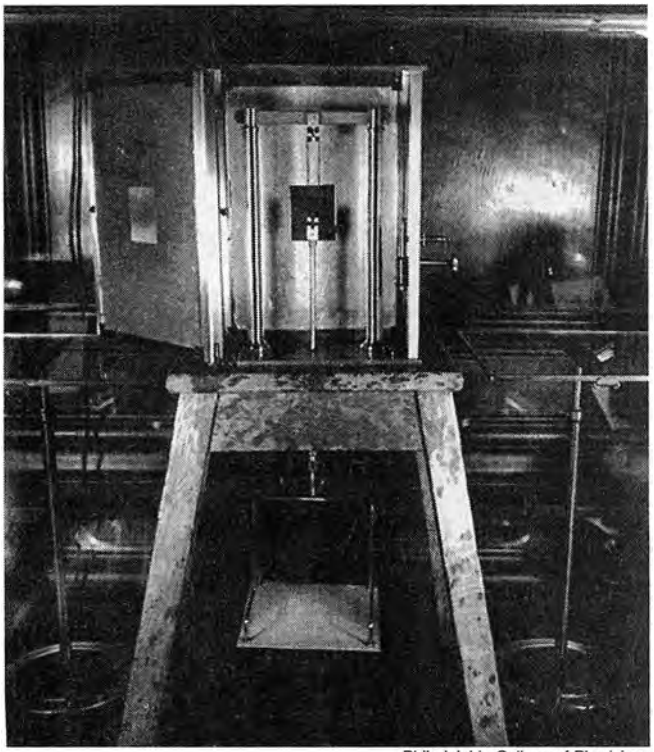
Dr. Abbe was one of the few American doctors who was convinced of the wonders of radium in treating patients, very early after the turn of the century. Some doctors had criticized Abbe's approach, and thought radium much too dangerous to be used. But Abbe was passionately involved in trying new techniques, and new ways to ease human suffering. He was enthralled by the seemingly paradoxical nature of radioactive substances.

In June 1915, Abbe presented an extremely interesting paper, which was read before the 66th annual session of the American Medical Association in San Francisco, and reported in the medical journal *Radium,* involving the "paradox" of beta and gamma rays. He talks about the early pioneers of X-ray technology (known then as Roentgen rays, after their discoverer), who were constantly exposed to gamma rays, which led to the growth of cancerous lesions on their fingers and hands. He had treated many of these cases, and reported in his paper:

> My first case so treated was 1903. Five years after beginning the use of the Roentgen ray, the patient developed a typical epithelioma of the back of the left hand. One application of radium cured it, and there has been no recurrence after 12 years.

After discussing other cases of men who developed cancer and were successfully treated, he reported:

> It seems almost a paradox of radiology that the accepted use of heavy gamma radiation from a Roentgen tube will cause a diseased condition of the skin, which a similar radiation from a tube of radium will cure. This becomes intelligible when we know that the output of the Roentgen-ray tube is almost wholly composed of hard, penetrating, irritating gamma rays. The radium discharges the beta ray in great quantity, as well as the gamma ray. It is the beta ray that has been proved beyond question to be the efficient curative power, and it is only the secondary betas generated by the gamma when striking any resisting substance, that gives it its value in the Roentgen-ray tube work.



Philadelphia College of Physicians

The glass display cabinet donated to the College by Dr. Robert Abbe. Its centerpiece is one of the original quartz piezo-electrometers built by Pierre Curie and used in their research, a gift from Marie Curie.

> Hence, we can understand that surface lesion of morbid cell growth, be it hyperkeratosis or basal cell, is happily cured by the large output of soft radiation of radium. . . .
>
> To sum up, I may say that no cases have presented themselves to me of chronic dermal Roentgen-ray disease in the early stage of thick patches, cracked, ulcerated and painful or of epithelial growths . . . which have not yielded to radium therapy.

Cancer treatment has evolved tremendously since the turn of the 20th Century, from primitive radium therapy—making use of radon (the gas emitted from radium) encased in platinum tubes and applied directly to cancerous tumors. Today medicine uses scores of new radioisotopes, some with half-lives that are only hours long, for diagnosis and treatment, saving countless lives. Dr. Abbe was a bold pioneer in treating cancers, as well as other diseases, with radium and can perhaps be called the father of nuclear medicine.

Madame Curie Captivates America

Marie Curie was the special guest of honor at the College of Physicians on her tour of America, on May 23, 1921, where she was welcomed by Dr. Abbe. It was Marie's wish that he give the speech in her honor, and it was Dr. Abbe who unveiled the priceless gift that she had sent to them. It was the only official "present" that Marie gave to anyone in America. Dr. Abbe's speech referenced all the artifacts in the cabinet, and when he finally got to the quartz piezo-electroscope, his inner muse took over:

> Let us imagine some future evening here in this beautiful hall after the scientific audience has gone, the lights are turned out, the janitor has made his rounds, locked the door, and gone home, the moonlight streaming in the tall windows near the case, the Liberty Bell in Independence Hall has struck midnight by some fairy hand. Then the little fairy spirits that stand guard over these mementos awake. From the Curie instrument one stretches out his hand and touches another of one guarding the Pasteur crystal, grasps it and a chatter in French breaks the silence. This wakes up the sprightly guardian of Lister's instruments and Jenner's inkstand, who join in an international parley at which the American spirit of Dr. Rush climbs out of his invisible retreat and they all dance about and narrate their wonderful past. Then one can see the dawn breaks they all hide again invisible. The janitor unlocks the library and visitors come to study and pay homage to the great names we all worship. This historic instrument will not be lonely. . . .

Abbe ended his speech with a tribute to American women:

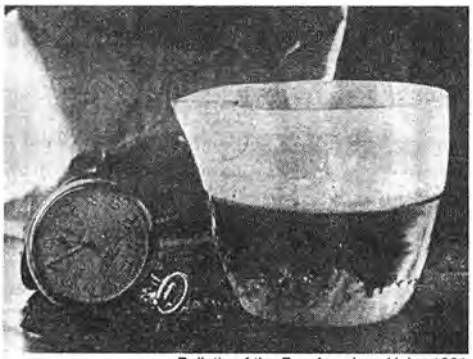
> It has been a heart-warming sight to see the universal response of the women of our broad land, poor and rich, contributing as they could to fund to equip Madam Curie's laboratory. The great good that has emanated from them is sure to be now continued.

At the close of his address, Marie Curie rose, put her hand on the quartz piezo-electroscope, and said: "I am glad to present this instrument to so distinguished a society."

Marie Curie's Tour

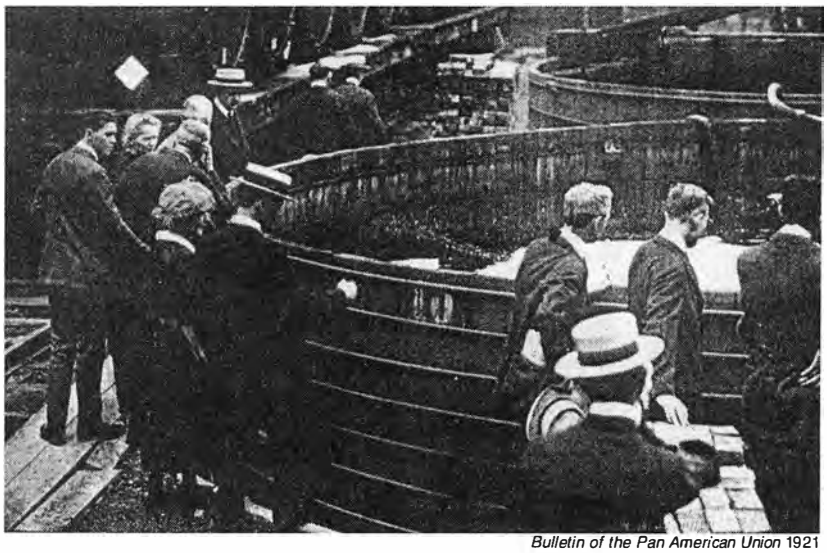
From the day she landed in New York City, May 11, to her departure in late June, Madame Curie was greeted with flowers, song, and speeches. On May 12, the *New York Times* reported her arrival on page one, with a story headlined "Madam Curie Plans to End All Cancers." This had nothing to do with what Marie Curie said, but was probably the work of Missy Meloney, who wanted to make the greatest impression possible on the consciousness of the American people. Almost as soon as Marie arrived, a well-wisher shook her hand so hard, she had to have it bandaged. Despite the publicity, which she detested, she loved meeting people, and being shown the "best" in America, especially the sacred places of science. The American people loved their scientific "Joan of Arc."

The first gala event for her was at New York's Carnegie Hall, on May 18. It was the largest meeting of American college women that had ever taken place. There were 3,500 representatives of nearly every major woman's college on the Eastern seaboard. The meeting was called to honor Marie Curie, and also was an organizing meeting to launch a movement to bring about disarmament and stop all wars. The event



Bulletin of the Pan American Union 1921

The radium produced for Marie Curie by the Radium Research Laboratory of the Standard Chemical Company in Pittsburgh. The radium looks like table salt, at the bottom of the container. It was presented to Marie in 10 small tubes, contained within a lead-lined steel box inside a mahogany box, that weighed 125 pounds.



Bulletin of the Pan American Union 1921

Marie Curie (upper left) studies the process of radium refining at the Pittsburgh plant.

Bulletin of the Pan American Union 1921

Chemical preparation of samples to assess their radium content, prior to extraction at the Radium Research Laboratory.

was organized by the American Federation of University Women of the International Federation of University Women. The President of Wellesley College, Ellen Pendleton, presented Marie Curie with the Ellen Richards Memorial Prize, a cash award of $2,000.

The ceremony at Carnegie Hall was unprecedented for its time. As Marie Curie entered the hall, the entire audience stood and applauded for several minutes. The Vassar Glee Club sang an original song written by a member of the faculty, with words composed by a student. She also received a *fleur-de-lys* from representatives of physics and chemistry courses of 15 women's colleges. Madam Curie was moved by the assemblage, and told them: "I thank you from the bottom of my heart for the welcome you have extended to me, and I shall never forget the warmth of your reception."

Just a day earlier, Marie Curie was honored at an event at the American Museum of Natural History. Dr. Michael L. Pupin, Professor of Electrical Mechanics at Columbia University (himself a Serbian immigrant whose first job in America was as a farm laborer) said that "the knowledge of radioactivity which she had helped to reveal was founding a new structure of physics, in which all matter is electricity and each atom a perfect system of electrons." Dr. Robert Abbe was in attendance, and was identified by the *New York Times* in its coverage as "the first surgeon in America to substitute radium treatment for the knife in cancer treatment." Abbe said:

> Today we see a little chance of conquering this last great scourge that has afflicted humanity. . . . That cancer in its milder forms can be cured by radium is indubitable. Humanity demands a cure for the disease in its gravest and most malignant forms, but it will have to wait, for though success is coming, it is coming slowly. Within the next few years I am confident that Madam Curie will be able to reveal something new in this remarkable agent that will help all humanity. In the name of all the sufferers who have been saved and in the name of humanity I thank her for what she has done and is to do.

Also present at the event was Dr. Robert B. Moore, chief chemist of the United States Bureau of Mines, who said:

> The appreciation of science by the women of America will be quadrupled by Madam Curie's visit to us. . . . Thank God we are through with the chemistry of war and back to the chemistry of peace and good will and healing. I bring to Madam Curie, the mother of radium, the love, admiration and affection of the chemists of America.

Other important scientists and doctors present at the event also spoke affectionately of Marie.

The Women's Colleges

Almost as soon as she arrived from France, Marie Curie began a tour of some American universities. In particular, young university women had been very active participants in the fund-raising efforts for the Marie Curie Radium Fund. According to the *College News,* at Bryn Mawr College in Pennsylvania (April 20, 1921), the students' quota for the "gift" from all the universities combined was $41,000, and every female student was asked to give "one dollar."

One of the first colleges Marie visited was Smith College in Northampton, Massachusetts. A young college student at Smith wrote to her mother, the day of the event, May 13, 1921:

> We've done nothing but talk about Madam Curie's visit for a week and we all, of course, went to the ceremonies. They are just over. It was *so* impressive.

The young woman detailed for her mother what everyone wore, where the upper and lower classmen sat, the honor guards, the marching upon the stage, and every detail she could muster:

> Madam Curie and President Neilson came in last and the ceremony and speeches began. . . . The head of the French Department welcomed her in French. Then the head of the Chemistry Department told of her wonderful life work. . . .

The student continued in this vein, describing the singing of the Alma Mater, the faculty procession:

> We all formed a double line of girls from the "Libe" [library] clear across campus to the Hall and serenaded her en route. She was very sweet looking but she looked tired and pale. . . . She is extremely shy and modest.

It was no wonder that Madam Curie was so tired, for after these ceremonies, she departed immediately for Vassar College and West Point. Marie Curie had never fully recovered from her very exhaustive five years on the battlefield of France. Years before that, she had labored unceasingly in the discovery of radium, the development of radium metal, and the work on polonium, running the Radium Institute, and coordinating work with Dr. Regnaud of the Institute's biological section. Her trip to America was not a vacation, and definitely wore her down. Nevertheless, she made herself available at every opportunity because she understood the positive impact her presence had on the millions of American women who made her their idol, especially the women studying at universities.

Madam Curie spoke little at most of these ceremonies. That is why it is particularly interesting that she gave a modest speech at Vassar College the next day, her only one at an American college. Her address is titled "The Discovery of Radium" and is a short, eloquent story of her early work with Pierre Curie, and how she developed the idea that other radioactive elements existed, and how they discovered them. A copy of the address can be purchased from Vassar, which has Marie Curie's writing on the cover, with these words:

> It is my earnest desire that some of you should carry on this scientific work and will keep for your ambition the determination to make a permanent contribution to science. . . .

Other universities and colleges were privileged to have Madam Curie as their special guest, and many conferred honors upon her at their convocations. Women's Medical College in Philadelphia received a visit May 23; also that day, she received the honorary degree of Doctor of Law and Philosophy at the University of Pennsylvania. She spent a few days at Bryn Mawr College, as a guest at the home of the dean, and on May 25, she visited Pittsburgh, and received the degree of Doctor of Law. On June 1, she received the Doctor of Science degree from Columbia University

In Madame Curie's *Autobiographical Notes,* she talks about the universities for women in America:

> My short visit could not permit me to give an authorized opinion on the intellectual training, but even in such a visit as I made, one may notice important differences between the French and American conception of girls' education, and some of these differences would not be in favor in our country. Two points have particularly drawn my attention: the care of the health and the physical development of the students, and the very independent organization of their life which allows a large degree of individual initiative. . . .
>
> The colleges are excellent in their construction and organization. They are composed of several buildings, often scattered in very large grounds between lawns and trees. Smith is on the shore of a charming river. The equipment is comfortable and hygienic, of extreme cleanliness, with bathrooms, showers, distribution of cold and hot water. The students have cheerful private rooms and common gathering rooms. A very complete organization of games and sports exists in every college. The students play tennis and baseball; they have gymnasium, canoeing, swimming and horseback riding. Their health is under the constant care of medical advisers. It seems to be a frequent opinion of American mothers that the existing atmosphere of cities like New York is not favorable to the education of young girls, and that a life in the country where the open air gives more suitable conditions for the health and tranquility of studying.
>
> In every college the young girls form an association and elect a committee which has to establish the internal rules of the college. The students display a great activity: they take part in educational work; they publish a paper; they are devoted to songs and music; they write plays, and act them in college and out of it. These plays have interested me very much in their subjects and the execution. The students are also of different social conditions. Many of them are of wealthy families, but many others live on scholarships. The whole organization may be considered as democratic. A few students are foreigners, and we have met some French students very well pleased with the college life and studies.

Every college takes four years of study with examinations from time to time. Some students afterwards do personal work, and acquire the degree of Doctor which does not exactly correspond to the same title in France. The colleges have laboratories with many good facilities for experimentation.

I have been strongly impressed by the joy of life animating these young girls and expanding on every occasion, like that of my visit. If the ceremonies of the reception were performed in a nearly military order, a spontaneity of youth and happiness expressed itself in the songs of greeting composed by the students, in the smiling and excited faces, and in the rushing over the lawns to greet me at my arrival. This was indeed a charming impression which I could not forget [Curie 1923, pp. 230-232].

Marie Curie spent some time in Pittsburgh, as she was very keen to visit the Standard Chemical Company, which was where radium was manufactured in America. She loved her time in Pittsburgh, and enjoyed talking to the scientists and engineers about radium production. However, the greatest part of her trip was yet to come. The United States had become the world's largest manufacturer of radium in the world, and she was to visit the mines and manufacturing places of the American West.

The Grand Canyon: Mining the Precious Ore for Radium

Several weeks later, she visited Colorado, the Grand Canyon, and the mining areas in the region, where radium was extracted from carnotite, a uranium ore. Carnotite is a mineral, usually bright yellow in color, which had attracted the attention of early settlers. The Ute and Navajo Indians are said to have used it for yellow pigments. *Radium* magazine, in 1913, described it as follows:

Pure carnotite mineral contains from 20% to 54% UO_3, from 7% to 18% vanadium pentoxyde, 5% to 6.5% K_2O, 0.3 to 2.8% barium oxide, 1.6% to 3.3% calcium oxide, small quantities of lead, and traces of aluminia, iron, arsenic, and phosphorous. The mineral powder is always mixed with more or less quartz and sand, and the intensity of the yellowish color of this mixture permits the prospector to get quickly a rough estimate of the richness of the material. Very rich mixtures of carnotite with sand stone does not contain more than 1.5% to 6% U_3O_8. Such carnotite sand stones were found on accurate analysis to contain from 3.5 to 15 milligrams of radium [metal] per ton.

Madame Curie especially enjoyed her trip to the Grand Canyon. It served as a respite to her frantic schedule, and gave her time to relax. She and her daughters rode ponies and mules, up and down the hills where the ore was mined. She was happy to note that the miners were using the exact method of treating the ore, which she and Pierre had invented. Carnotite is not as rich in radium as is pitchblende, and extracting the radium was a huge enterprise. After the Curies had discovered radium and polonium, the Austrian government promptly made a monopoly out of the large deposits of pitchblende that existed, although every bit of radium produced was sold for science, at a loss. The first production of radium in America was at the Carnotite Chemical Reduction Plant in West Seneca (in today's Lackawanna) outside of Buffalo, New York. The plant operated from 1902 to 1908

A Buffalo attorney, Stephen Lockwood, with the assistance of a Washington, D.C., millionaire, Thomas F. Walsh, were the first to attempt to produce high-grade radium. They fought, unsuccessfully, to create a U.S. Government Bureau of Mines. It was their stated desire to keep the cost of radium down. Mr. Lockwood had carried on correspondence with Pierre Curie in the very early 1900s, sending him samples of their product, which were often weak, and Pierre would advise him of how best to go about production.

Eve Curie refers to Stephen Lockwood, in her biography of her mother, in the section of her book about why her parents decided not to apply for patents. She quotes her father: "No, it would be contrary to the scientific spirit. . . . I shall write tonight, then, to the American engineers, and give them the information they ask for. . . ." This is a reference to Stephen Lockwood. Years later, when Eve was writing her mother's biography, Lockwood sent her a beautiful manuscript, as a souvenir, which contained Lockwood's account of the development of the young radium industry in Buffalo, and also the letters that Pierre Curie had written to him.

Bulletin of the Pan American Union 1921

The Colorado carnotite ore contained only 1 gram of radium in every 500 to 600 tons. The ore was reduced down to 125 tons, and then shipped to the Pittsburgh Radium Research Laboratory. Shown here is the crystallization room, where the radium is recovered by fractional crystallization—the same method used by Marie Curie in her original experiments.

After the Buffalo enterprise failed, a new radium industry was built in Pittsburgh in 1911, by Joseph M. Flannery. Flannery had made millions with his vanadium mining operation in Peru, and he poured most of the profits into radium. It was Flannery who discovered the merits of vanadium as an alloy for steel. Flannery built the Standard Chemical Company, headquartered in Pittsburgh, together with the extensive mining operation of carnotite in the wilderness of Colorado. The radium discovered by the Curies had been worked from 5 to 6 tons of pitchblende, and to extract radium from carnotite was even more arduous a task:

> In the Colorado ores there is only 1 gram of radium in every 500 or 600 tons of [carnotite] ore, and even to obtain each of these 500 or 600 tons it is frequently necessary to handle 100 tons of worthless material. . . . Burros were used to carry the ores from the deposits in the mountains to this mill, and to carry back to the miners water and other supplies. . . [*Bulletin of the Pan American Union* 1921, p. 38].

When Madame Curie and her daughters went to Colorado, this is what they saw:

> . . . [P]rospecting is done by drilling in what seem likely spots with jack hammers and with diamond drills . . . portable gasoline compressors were used as the source of energy. In this uninhabited area of southwestern Colorado, and southwestern Utah, pockets of carnotite were discovered from a few pounds of ore, to, in exceptional cases, 1,800 tons. Once the ore is mined, it is taken to a concentration mill nearby, where 500 tons is reduced to 125 tons. It is now in a powdered form, and shipped in 100 pound sacks, by wagon, and, where possible, by motor trucks, the 65 miles to Placerville, Colorado. Here a narrow-gauge railroad takes it to the transcontinental railroad at Salida, Colorado. From Salida it travels the 2,300 miles to Canonsburg, Pa., just outside Pittsburgh. . . [*Bulletin of the Pan American Union* 1921].

The mill in Colorado and the operation leading up to it, employed 300 men. In Canonsburg, which Madame Curie had visited earlier in her trip, the pure radium salts were produced: 1 part radium to 100,000,000 parts ore! There, on a massive scale, Madame Curie saw the exact procedure she and Pierre had devised 23 years earlier. Only here, the most modern technology of the day was at hand, and the quantities were much larger: The plant used 10,000 tons of distilled water, 1,000 tons of coal, and 500 tons of chemicals. Any vanadium and uranium that remained from this process was also saved for use.

The radium which Madame Curie received as a gift from the women of America came from this source. At that time, the going price for a gram of radium was $120,000, which was reduced by the industry to $100,000 in her honor. In 1921, the world supply of radium was said to be about 140 grams, and the Standard Chemical Company in the United States had produced 72.5 grams of this highly radioactive and precious resource. Nearly all of the world's radium was used in medical research, mostly in cancer. The fact that 1 gram was given to Madame Curie, through the contributions of American woman, and the American physicians who spurred the fundraising, is a tribute to our nation. France had given America Lafayette and the Statue of Liberty, and we were able to reply in kind with this noble gift.

After her Grand Canyon stay, Madame Curie travelled to Chicago, where two more honorary degrees awaited her. Chicago was the home of Dr. and Mrs. Vernon Kellogg, who were instrumental in helping Missy Meloney to bring Madame Curie to America. When they visited Paris, they were welcome guests at the Curie home. It was Missy and the Kelloggs who persuaded Madame Curie to write the beautiful biography of Pierre Curie, to which she appended her *Autobiographical Notes*. The Kelloggs also translated the book from French, and helped with corrections.

Madame Curie received honorary degrees from the University of Chicago and Northwestern University, where Dr. Charles Horace Mayo, co-founder of the Mayo Clinic, was also honored with a degree. In her *Autobiographical Notes,* Madame Curie mentions that she gave a lecture on the "Discovery of Radium" to the American Chemical Society in Chicago. Unfortunately, there is nothing written about this by the Society.

An amusing incident took place during her visit to Chicago. She was invited to swim in the new gymnasium pool at Northwestern, but refused, and she insisted instead that she wanted to be rowed out quite a distance into Lake Michigan to swim. Her host and hostess at the university were extremely nervous about this request, but they complied. The *Evanston News-Index,* headlined a page one story June 17, 1921, "Mme. Curie Likes It Over Her Head." The newspaper reported that her hosts

> nervously clasped and unclasped their hands. Meanwhile Mme. Curie stood up in the boat, and dived off. She swam about with evident joy and the hurry-up call for lifesavers was not sent in. She stayed in for about 20 minutes and was delighted. . . .

From Chicago, the Curies travelled by train to Buffalo, N.Y., and there to greet them were a group of prominent American-Polish academicians at the train station, who were mightily disappointed when the Curies decided to stop in Niagara Falls and see the sights there first. Madame Curie did, however, make a visit to the Gratwick Cancer laboratory in Buffalo (today it is greatly expanded and known as Roswell Park, located near downtown Buffalo). She was also honored in Niagara Falls by university women from Toronto, Canada, but she felt so ill that she could not attend the luncheon. She was made an honorary member of the Buffalo Society of Natural Sciences, but, again, she was too ill to attend the festivities. Madame Curie grew increasingly sick from her long and taxing journey, and stayed only two days in Buffalo, resting for most of that time.

The next stop for the Curies was Wellesley College in Massachusetts, followed by a trip to Boston. Although nearly every university that hosted Madame Curie had conferred

Marie Curie and Einstein

One of Marie Curie's greatest admirers among her scientific colleagues was Albert Einstein. In the early days, before Einstein's immense popularity, it was Madame Curie and Raymond Poincaré who were true friends and advocates of the young physicist. In the early 1950s, long after Madame Curie's death, Einstein was asked, in an interview, which physicist he respected the most. Einstein named two: Hendrik Lorentz and Marie Sklodowska Curie. Of Curie he said:

> I have always admired . . . Marie Curie. Not only did she do outstanding work in her lifetime and not only did she help humanity greatly by her work, but she invested all of her work with the highest moral quality. All of this she accomplished with great strength, objectivity, and judgment. It is very rare to find all of these qualities in one individual. In fact, if more European intellectuals had had Madame Curie's modesty, conditions might have been brighter [*Polish Review,* p. 131]

Radiological History and Heritage Charitable Trust

Marie Curie with Albert Einstein in Geneva, 1925.

Both Curie and Poincaré gave outstanding references to Einstein when he offered to teach at the University of Prague. Marie wrote:

> I much admire the work which M. Einstein has published on matters concerning modern theoretical physics. I think moreover, that mathematical physics are at one in considering his work as being in the first rank. At Brussels, where I took part in a scientific conference attended by M. Einstein, I was able to appreciate the clearness of his mind, the shrewdness with which he marshaled his facts, and the depth of his knowledge. If one takes into consideration the fact that M. Einstein is still very young, one is justified in basing great hopes on him and in seeing in him one of the leading theoreticians of the future. I think that a scientific institution which gave M. Einstein the means of work which he wants, by appointing him to a chair in the condition he merits, could only be greatly honored by such a decision and would certainly render a great service to science [Clark 1971, p. 149].

When Einstein and his wife, Mileva, went to Paris, in March 1913, they stayed with Madame Curie. A delightful trip to Zurich by the Curies, where they spent the holiday with the Einsteins hiking through the mountains on foot, was fondly remembered by one of Einstein's sons. He recalled how Marie would demand that his father name every peak on the horizon. They had discussions on the new discoveries in radioactivity, and Einstein would postulate his ideas on subnuclear particles, and their relativistic speeds. Eve Curie remembered that her mother was one of the few people in all of Europe, "with her exceptional mathematical culture," who could talk to Einstein about his ideas. (As a youngster, one of Marie's intellectual heroes, she notes, had been Carl Gauss.)

On June 24, 1922, Einstein's good friend, German Prime Minister Rathenau, was assassinated, and a wave of anti-Semitism began to sweep Germany. At this time, Einstein was a member of the International Committee on Intellectual Co-operation, along with Madame Curie. The Committee had been formed out of the ashes of World War I, as part of the League of Nations. Curie thought this was an important scientific body, and her interest was in the area of scientific education. Several weeks after Rathenau's death, Einstein wrote to Curie to explain that he was resigning: "not only because of the tragic death of Rathenau, but because on other occasions I have observed a strong feeling of anti-Semitism among the people whom I am supposed to represent; as they seem on the whole to lean that way, I feel that I am no longer the right person for the job."

Madame Curie wrote back to him, urging him to stay on, and insisting that this is what Rathenau would have wanted him to do. The situation for scientists in Germany was not good, however, and the Treaty of Versailles, among other things, had hurt the good will toward scientists there. First, no German scientist was allowed to go to the Solvay Conference in 1922, except for Einstein; second, he was the only German scientist invited to be on the Committee at the League of Nations. This disgusting set of circumstances, put Einstein in a vise. Nonetheless, Marie pushed him:

> I have received your letter, which has caused me a great disappointment. It seems to me that the reason you give for your abstention is not convincing. It is precisely because dangerous and prejudicial currents of opinion do exist that it is necessary to fight them, and you are able to exercise, to this extent, an excellent influence, if only by your personal reputation which enables you to fight for toleration. I think that your friend, Rathenau, whom I judge to have been an honest man, would have encouraged you to make at least an effort at peaceful, intellectual international collaboration. Surely you can change your mind. Your friends here have kind memories of you [Clark 1971, pp. 354-355].

Einstein responded to her that he was convinced that the League of Nations, not the Committee on Intellectual Co-

operation, "was a pliant tool of power politics under the cover of objectivity. . . ." He and Curie remained firm friends, despite their differences, and later, Einstein relented and did rejoin the Committee.

Madame Curie and Paul Langevin were responsible for the invitation to Einstein to lecture at the Sorbonne in 1922, which he accepted. The animosity between France and Germany after the war was so deep that many members of the French Physical Society threatened to protest the event. Einstein had to "be secreted from the French-German border into Paris by Langevin," and although the event was a rousing success, "nationalist papers" on both sides attacked the event (*Polish Review,* p. 136).

After Madame Curie died in July 1934, a Memorial Celebration of her life was held in New York City, on January 23, 1935. Present were the Ambassador of Poland Stanislaw Patek, the Consul General of France and Poland, and Mayor LaGuardia of New York. Albert Einstein eulogized his colleague and friend, in a beautiful statement (found in the Meloney Collection at Columbia University Library):

> When an outstanding person such as Madame Curie has completed her life's course, we should remember what she gave as the fruit of her work to humanity, because the ethical qualities of leading personalities of a generation are of greater importance for that generation and for posterity than the purely intellectual accomplishments. And these latter are, to a higher degree, dependent, more than one usually thinks, on the greatness of character.
>
> I had the good fortune to be connected with Madame Curie through a beautiful and unclouded friendship of 20 years, during which I learned to know and admire her human greatness, in an ever-increasing degree. She had a strong and definite will, possessing a sternness towards herself, with an objectivity which made it impossible for any prejudice to influence her decision. These qualities are seldom combined in a human being. At all times she was aware of being a servant to humanity, her deep modesty never allowing her to be self-satisfied. She was ever alive to the harshness and injustice of society, towards which she expressed herself through an outward coldness which might have been easily misunderstood by outsiders, and that specific sternness was not to be softened through any pretense. When she knew the path to be right, she would follow it without compromise and with the utmost determination.
>
> The greatest scientific achievements of her life, the proof of the existence and the isolation of radioactive elements, was due not only to a daring intuition, but also to a devotion and determination in the accomplishment under the most unheard of difficulties which have seldom been encountered in the history of experimental science.
>
> If only a small part of Madame Curie's greatness of character and devotion would be alive in the intellectual circles of Europe today, the destiny of Europe would be a better one.

upon her an honorary degree, Harvard had flatly refused to do so. Missy Meloney wrote to Harvard's President Emeritus, Dr. Charles Eliot, pleading with him to honor her. On December 18, 1920, Eliot wrote a note to Missy saying that he thought it was a fine idea, but that Dr. William Duane, who had worked with Madame Curie at the Radium Institute in Paris, and other members of the faculty, were opposed. According to Eliot, Dr. Duane reportedly said: ". . . credit does not entirely belong to her. . ." for the discovery of radium, and that since Pierre's death in 1906 ". . .she has done nothing of importance. . . ."

Missy was aghast. Whatever Dr. Duane did or did not say, there is no evidence that Marie cared at all. From all indications, Madame Curie truly liked Dr. Duane, and was anxious to see him and visit the laboratories at Harvard and at the Boston hospitals. Dr. Duane hosted the Curies while they were in Boston.

Harvard joined with Radcliffe, Wellesley, Simmons, and other New England colleges in welcoming Madame Curie to Boston, with a grand reception at the Sanders Theater. President Lowell of Harvard escorted her in, and Marie was greeted "with deafening applause by the 900 persons assembled there," according to the *Boston Globe,* June 21, 1921. The *Globe* reported that "The French tricolor draped with the American flag and the banner of Harvard was significant of the union of all countries and peoples in admiration of her greatness."

President Lowell said, "The discovery of Mme. Curie gave the world new ideas concerning the structure of the universe and opened a new path of thought to the scientists." Lowell then compared her to Isaac Newton. Prof. Richards of Harvard's Chemistry Department gave a speech, and a chorus of Polish children sang for her in the balcony above the stage. The Curies visited the Cruft Laboratory in Cambridge and also the Jefferson Laboratory.

Madame Curie, her two daughters, and Missy Meloney then departed for New Haven, their last stop before departing for France. There Madame Curie received a Doctorate of Science from Yale University. Again, there was a huge dispute at the university as to whether or not to confer on her the honor, and what happened was interesting. The chief of radiochemistry at Yale, Dr. Bertram Boltwood, along with most of the other academics in chemistry and physics, were against the honor. However, the medical doctors at Yale had their way, and the honor was bestowed.

Later, in 1925, John Johnston, head of the Chemistry Department at Yale, wrote to Robert M. Hutchins, Secretary of Yale, and said that there was no reason to invite Irène Curie to come to Yale (Irène had expressed the desire to do some research at Yale, as she thought it was one of the best equipped laboratories in the United States). Johnston wrote, " . . .moreover, had her name not been Curie, we should have heard little of her. . . ." Despite his prejudices, Irène and Frédéric Joliot-Curie were to win the Nobel prize in physics, 10 years later!

Madame Curie and her two daughters left New York on June 25, 1921, with their radium, mesothorium, and several tens of thousands of dollars that had been raised to help

finance the Radium Institute. She had avoided the press the entire time she was in America, though the press certainly had not avoided talking about her while she was there. The day before she departed, she gave a special interview to *Scientific American,* printed on July 9, 1921, headlined "A Chat with Madame Curie: What the Discoverer of Radium Thinks of Us and What We Think of Her," by Austin C. Lescarboura. The article discusses her thoughts about American universities:

> But the greatest of all, in Madame Curie's opinion, are our free institutions of learning, especially in such centers as New York City, where the lack of financial means need not necessarily stand in the way of the ambitious boy or girl desiring an academic training.

She was also asked what she thought of America's scientific laboratories, and whether Americans were too obsessed with "dollar-chasing habits."

> Here is the answer: startling, to be sure, but nevertheless true. Madame Curie believes that much of the work done in our leading laboratories and universities is done for the sake of science—pure science—and does not contain the slightest trace of industrial motives. Our government laboratories are doing wonderful work in many different directions for the good of science and humanity at large, and with the dollar sign conspicuous by its very absence. Truly, we are not the money grabbers or dollar chasers that we have been made out to be by others as well as in our own minds.
>
> Still, there is something wonderful about our industrial prowess. Madame Curie was delighted with our development of the radium industry; indeed, we have made an industry of it. . . .
>
> Despite 20 years of study and research devoted to radium and radioactivity, Madame Curie admits that she has much to learn. . . . Radium, she tells us, must be handled with great care. Careless or inexperienced handling may prove dangerous and perhaps fatal. We noted that one of her hands had been affected by the radioactive rays and her general health. . . .

Asked what she will do with the gram of radium, Marie describes the Curie Institute in Paris, and its division of labor between physicochemical and physicobiological, and said that the radium would be used in both divisions. She also mentioned that she was looking forward to a lengthy rest during the summer, with a return to work in September with radium and mesothorium. The magazine then informed its readers that "special precautions" had to be taken on the ship, to make sure that the instruments (compasses, and so on) were not affected by the radioactive cargo.

Another excellent article appeared in *Current Opinion,* on June 21, titled, "Madame Curie on the Healing Method of Radium" In that article, there are one and a half pages of quotations from her on her work against cancer, making it clear why she was so happy to have mesothorium. She was planning to use thorium X in experiments for treating cancer. This isotope, which has a very short half-life, is prepared using mesothorium.

The American Gift

Madame Curie was extremely grateful to the American population for its support of her work. As early as 1907, Andrew Carnegie gave her a series of annual scholarships, which enabled students from around the world to study with her. Over the years, Carnegie donated tens of thousands of dollars for this.

Five years after her visit to the United States, Marie wrote a paper called "The American Gift," published with an introduction by Dr. Francis Carter Wood, of the Crocker Memorial Cancer Research Laboratory at Columbia University, in which she describes the work done at the Radium Institute, in both the biological and physicochemical sections, and tells what kind of work she has been doing with that radium:

> My own experiments with the American radium have been mostly devoted to research on radioactive transformation. It is a well known fact that scientists have not been able till now to alter the course of these transformations by any means at their disposal, and this leaves us utterly in the dark as to the possible reasons of the transformation. We know that atoms of radium break up from time to time, producing spontaneous radiation, while atoms of lead, gold, or other metals do not show radioactivity, but why it is so, we could not tell. . . . If this could be done, the experiment would throw light on the cause of the atomic change and on the atomic structure. . . [Meloney Collection].

She describes other theories and experiments done by other physicists, and then talks about her experiments with polonium:

> Thus, in several series of experiments with polonium exposed to the radiation of radium, I noticed a small increase of the rate of transformation of polonium; however the whole evidence made me think that the effect was not to be looked on as a true change in the average life of polonium atoms, but rather as a decrease of intensity related to a slight superficial alteration in the disposition of the radioactive material. Neither in this case nor in other cases could I make sure of a change in the rate of transformation, even to the extent of one in [a] thousand.
>
> I am also pleased to mention the interesting experiments performed by Dr. Welo, an American scientist, who worked some time in my laboratory and tried by a sensitive method [to discover] if the absorption of γ [gamma] rays could be provided by the American radium tubes. No effect, however, was observed. The work had been undertaken as a possible test for some theoretical views on the shape of the electron.
>
> It is my wish to express to the Committee of the Marie Curie Radium Fund and to the President of the Committee, Mrs. W.B. Meloney, my high appreciation of the friendly gift. It is dear to me not only because it

brought a very important increase of working means for my Institute; but even more so as a symbol of the sympathy of a great nation for a scientific ideal. A beautiful example has thus been given and a step has been made to the nearer understanding of this ideal by all citizens. Pasteur has said that "Laboratories are sacred places, temples of the future, where humanity grows, fortifies itself and becomes better," that they ought to be multiplied and ornamented, because in them is our hope of welfare by peace and civilization. Surely that feeling inspired my friends in [the] United States who wanted to give me support in my activity. . . .

A Second Gram of Radium: 1929

During the 1920s, Madame Curie's work involved running the Radium Institute in Paris, and she was also responsible, along with her sister, Bronya, for building the Radium Institute in Warsaw, Poland. The financial situation in Poland after World War I, was even more disastrous than it was in France, as Poland had only just become a nation for the first time in more than a hundred years. To build the Institute in Warsaw, the Polish population was appealed to in the most direct fashion. Subscriptions to buy a "brick" for the building were taken by every person, as Poland's most famous citizen called on the population to create the new institute. The greater problem, however, was to secure the radium. Marie had used some of the money she received from her first trip to America, to "rent" radium for the scientists in Warsaw.

Once again, in 1928, Marie appealed to her good friend, Missy Meloney, telling her plainly that she needed another gram for the Polish Radium Institute, and asking whether something could be done from the good-hearted people of America. By this time, Missy was no longer with the woman's magazine *The Delineator,* but had become the editor of the *Sunday Magazine* of the *New York Herald Tribune*. Marie also had plans to bring Bronya to America for her next trip to America.

Missy, who could be counted on to do anything for her dear friend, began to organize the second Curie trip to America. Missy told Marie: "I no longer find many things in life worthwhile, but to serve in even this menial way in a great cause is a real compensation for me" (Reid 1974, p. 291). However, Missy had to explain that there were some problems with this second campaign. The American population had become politically "small-minded," and had become, through their own fault, "isolationists" and backward. Missy begged Marie not to bring Bronya to America, because she was afraid that the American people would not be as magnanimous as they had been in 1921, and, therefore, would not respond to helping Poland. She had already arranged for Marie to be an "official" guest of the White House, with an invitation from the newly elected Herbert Hoover, whom Missy thought was magnificent. Missy was a staunch Republican, and wrote many letters to Marie about Hoover saying that he was a "scientist and a humanitarian" and not "a politician," and that he was on the Marie Curie Radium Fund Committee of 1921 (Reid 1974, p. 292).

Hoover, a much maligned President, was an engineer, had met Curie on her first trip to America. His invitation to stay at the White House was a "first," as no foreigner had ever been given such a privilege. Hoover's Achilles' heel was his stupidity on the issue of economics, and his reluctance to do what was necessary to end the depression, which his successor, Franklin Delano Roosevelt, was able to do. While Madame Curie was in America in 1929, one of the events that she attended was the 50th anniversary celebration of Thomas Edison's invention of the electric "lamp," an event attended by scientific and political dignitaries from all over the world. Hoover gave a tribute to Edison, in which he also specifically attacked Malthusian ideology:

> It is the increasing productivity of men's labor through the tools given us by science that shattered the gloomy prophecies of Malthus. More than a century ago that great student held that increasing population would outrun the food supply and starvation was to be the inevitable executioner of the overcrowded earth. But since his day we have seen the paradox of the growth of population far beyond anything of which he ever dreamed, coupled at the same time with constantly increasing standards of living and ever-increasing surplus of food. Malthus was right except for a new contestant in the race with his principle: That was more scientific research, more discovery. And that race is still on. If we would have our country improve its standard of living and at the same time accommodate itself to increasing population, we must maintain on an even more liberal scale than ever before our great laboratories of both pure and applied science. Our scientists and inventors are amongst our most priceless national possessions. . . [*Science* 1929, p. 412].

Unfortunately, the American population was not so enlightened. So while Marie did return to America, Bronya made the decision not to go, thinking that her presence might detract attention from the radium mission. At the same time, in order to keep the cost of the radium down, nations were allowed to enter bids, and Belgium won with the asking price of $50,000 per gram, which enabled the Marie Curie Radium Fund Committee to raise the funds. In fact, when Marie arrived on October 15, 1929, the *New York Times*'s article, titled "Mme. Curie Arrives, Happy to Be Back," makes no mention of Poland, until the very end of the article, reporting, "This gram of radium Mme. Curie will donate to the Radium Institute under construction at Warsaw." In other press coverage of her trip, Poland is either not mentioned, or is referred to in this fashion.

Marie's health had not improved since her last visit, and she had a great difficulties with her sight, so Marie visited only one college, and kept her visit short.

Her only public appearance, in New York, was on Oct. 31, as the guest of honor before the American Society for the Control of Cancer (later called the American Cancer Society), which was headed up by Mrs. Robert Mead, a prominent woman in New York and one of the driving forces for the Marie Curie Radium Fund. Her remarks were broadcast on the radio.

Cancer was considered to be such a scourge that in

1927, U.S. Senator Matthew M. Neely of West Virginia, made a public offer to reward $5 million to anyone who could cure it. At this time in history, cancer research was privately funded. It wasn't until August 5, 1937, when Franklin Delano Roosevelt signed into law the creation of the National Cancer Institute, that the fight against cancer received federal funding. The Institute was a division of the U.S. Public Health Service, and had to report to the Surgeon General.

Madame Curie was particularly excited by her visit to General Electric in Schenectady on Oct. 23. In honor of her visit, General Electric had closed the plant and put everything at her disposal; the only previous time this had been done was when Charles Lindbergh visited the plant. Her guide was Dr. W.D. Coolidge, the inventor of the Coolidge X-ray tube. Madame Curie was invited to carry out any experiment that she wished, and to use any apparatus that interested her, with the assistance of any scientist at the plant.

On October 25 and 26, she was the guest of St. Lawrence University in Canton, New York. The University had constructed the Hepburn Science Building, named after philanthropist A. Barton Hepburn, who had given $300,000 to build it, and Madame Curie had been invited to dedicate the building in 1926. At the time, she could not attend, so the University had waited for the dedication until she arrived, three years later. On the doorway of the Hepburn Hall of Chemistry is a bas-relief of Madame Curie and Owen D. Young, of the General Electric Corporation, a graduate of St. Lawrence, who hosted Madame Curie on her 1929 tour.

St. Lawrence University

The Hepburn Science Building, at St. Lawrence University, which Madame Curie dedicated on her 1929 trip to America. At the doorway is a bas-relief of Marie Curie (at right). Inset is a photo of Curie with Owen Young of General Electric, a St. Lawrence graduate who hosted her on this visit.

At the dedication ceremony, Madame Curie said:

> I dedicate this laboratory to scientific research in the field of chemistry. It is a pleasure as well as an honor for me to have been asked to come to St. Lawrence University on this occasion. I appreciate highly this new important development of the University, and fully realize the need of it at a time when physics and chemistry are in constant and amazingly rapid progress. It gives confidence in the future of your University to know that as soon as the need had been made clear the new laboratory was erected by the devotion of those who have been educated here. I am in sympathy with the feeling that having received high education one should have the desire to extend the same privilege to others. I also believe that pure scientific research is the true source of progress and civilization and that by creation of new centers the number of men and women who are able to devote themselves to science shall be increased. For all these reasons I congratulate St. Lawrence University. . . .

After this ceremony, Madame Curie was asked to plant a beautiful symmetrical evergreen to the west of the building, "to become a living momento of her visit to St. Lawrence." She was handed a small souvenir-size shovel, which was supposed to be used to dig a symbolic shovel of dirt. However, Madame Curie put the small shovel aside, picked up a real shovel, and began digging the hole herself. Everyone was surprised by her enthusiasm. "I do this very willingly, and hope that your University will grow as the tree," she said.

Also, on the occasion of her visit, the oldest member of the faculty, Dr. Charles Kelsey Gaines, from the class of 1876, composed the following sonnet, which he read to her, after she received an honorary Doctor of Science degree:

To Madame Curie

What age-long effort had essayed in vain
This woman wrought. She loosed the Gordian knot
That held the conquest of the world, and what
The frustrate alchemist could ne'er attain
She has achieved. She broke the primal chain
That binds the elements; she touched the spot
Where lies the hidden spring," and lo! The plot
And secret of the universe lay plain.
Yet what the alchemist in vain had sought
For greed and dazzled by the lure of gold,
She only that she might the truth unfold,
Still toiling for the love of man, has wrought.
Let all the ghosts of alchemy bow down,
While on this woman's brow we set the crown.

On October 30, 1929, Madame Curie was presented with a check for $50,000 from President Herbert Hoover in the building of the National Academy of Sciences and National Research Council. Less than a week earlier, Black Thursday had hit America, thrusting the nation into years of economic chaos. President Hoover, however, paid the following tribute to Madame Curie:

I am sure that I represent the whole American people when I express our gratification to Madame Curie that she should have honored our country by coming here. We give to her the welcome of a people who are grateful for the beneficent service she has given to all mankind.

It is not necessary for me to recount the great fundamental discovery associated with the names of her late husband and herself. The discovery of radium was an outstanding triumph of research in the realm of pure science. It was indeed a great and successful exploration into the unknown from which a new truth has brought to the world a practical revolution in our conceptions of substance. It has advanced all thought on the constitution of matter. And like all great discoveries of fundamental substance and fact it has found application to human use. In the treatment of disease, especially of cancer, it has brought relief of human suffering to hundreds of thousands of men and women.

As an indication of the appreciation and the respect which our people feel for Madame Curie, generous-minded men and women under the leadership of Mrs. William B. Meloney have provided the funds with which a gram of radium is to be purchased and presented to the hospital and research institute which bears her name in Warsaw. The construction of this hospital was a magnificent tribute by the city of her birth and the Polish people, in which the American people are glad to have even this opportunity of modest participation. The whole of this occasion where we pay tribute to a great scientist is again a recognition of the fundamental importance of scientific research and a mark of public appreciation of those who have given their lives to human service through its profession.

Madame Curie, upon accepting the check, responded:

Mr. President, ladies and gentlemen:

I am conscious of my indebtedness to my friends in America who, for the second time, with great kindness and understanding, have gratified one of my dearest wishes. I feel deeply the importance of what has been said by the President of the United States about the value of pure science; this has been the creed of my life. Scientific research has its great beauty and its reward is itself, and so I have found happiness in my work. It has been, however, an additional, as well as [an] unexpected happiness to know that my work could be used for relief in human suffering. I do not believe that I deserve all the praise that has been given me, but I highly value the friendly feeling expressed by the President and by Dr. Welsh.

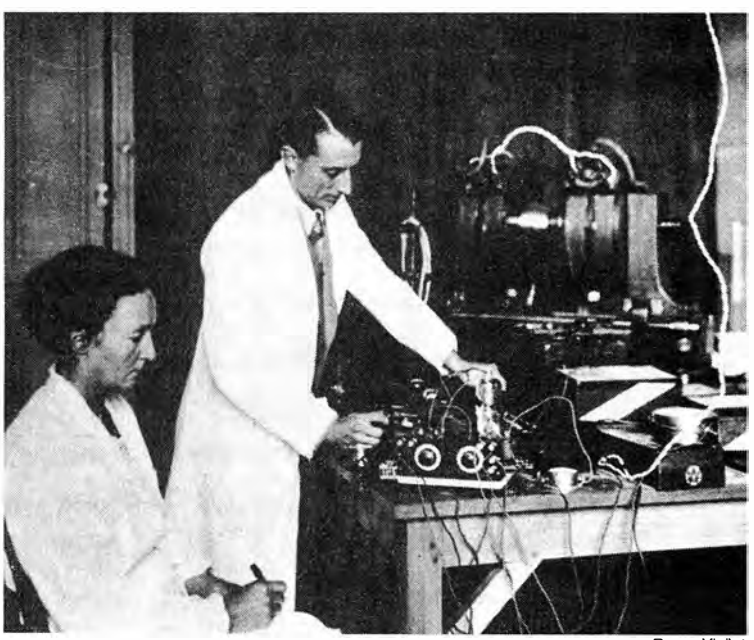
Mr. President, in my native land your name is revered for having saved, by your humanitarian work, a large part of the young generation. Your kind words of today will add to the gratitude of the Polish people toward you. In accepting this precious gift, which will hasten the opening of the Radium Institute in Warsaw, I offer you, and all my American friends, my most profound thanks. My laboratory in Paris will keep in close relation to the Warsaw Institute, and I will like to remember the American gifts of radium to me as a symbol of endearing friendship bridging your country to France and to Poland.[1]

Marie Curie's Legacy

In 1932, Madame Marie Sklodowska Curie returned to Poland to dedicate, along with her sister Bronya, the Warsaw Radium Institute. It was to be her last journey to Poland.

In the years that she directed the Paris Radium Institute, she was to develop hundreds of young scientists who were privileged to work with her. The Pierre Curie Radium Institute became the top international center for the study of radioactivity, with its main rival being the Cavendish Laboratory, headed up by Sir Ernest Rutherford. In Paris, however, Marie chose researchers from all over the world, and she always made sure that women were included.

Many of the scientists who worked with Marie Curie made their own important contributions. In 1929, Salomon Rosenblum, using radioactive actinium, which Marie herself had prepared for him, found that alpha particles were not all emitted with exactly the same energy. Paralleling similar findings for emitted light, this helped to confirm the existence of the quantum and implied that analysis could reveal the internal structure of the nuclei giving off the alpha particles. Fernand Holweck confirmed that X-rays are a form of radiation similar to light. Bertrand Goldschmidt



Roger-Viollet

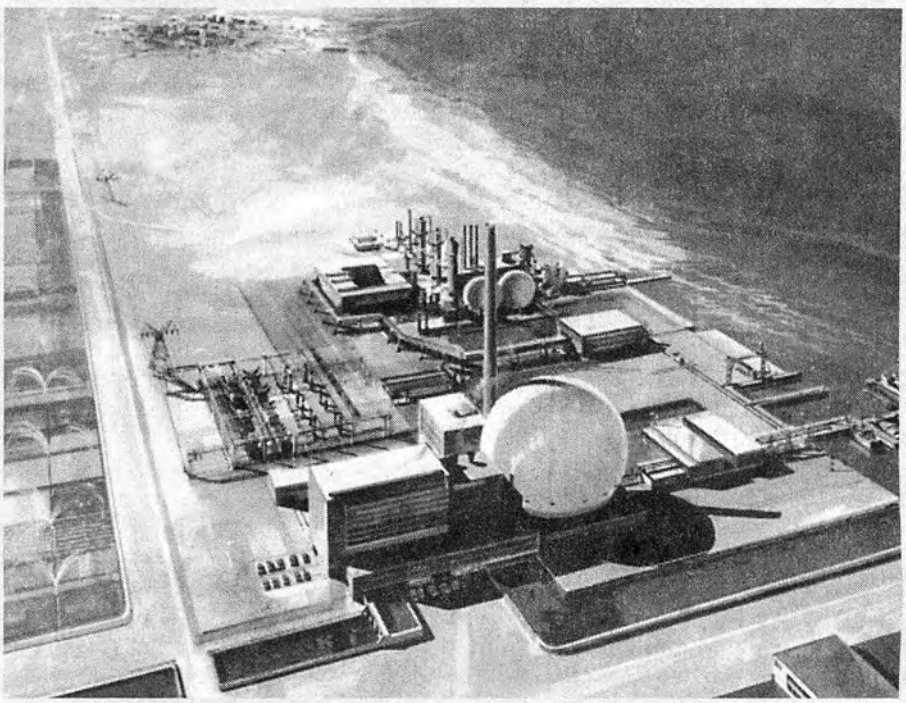
Irène Curie and her husband, Frédéric Joliot, the discoverers of artificial radiation, at their laboratory in the Radium Institute.

1. I found the handwritten speech by Marie Curie in the Meloney Collection at Columbia University, with corrections made in her hand. I took the liberty of correcting a few spelling errors, and of leaving what she had crossed out, out of the speech. I have not seen either her speech, or that of Hoover, published anywhere else.

The Promise of Nuclear Power As Seen from 1967

Nuclear scientist Dr. Glenn Seaborg's remarks at the centennial celebration of Marie Sklodowska Curie's birth, included the following review of the economics of advances in nuclear power:

> While abundant and low-cost energy is not the only key to a nation's well-being, I believe it plays a most important part in the progress of a country. . . . In my talk last year before the British Nuclear Energy Society, I graphically plotted the world's population growth, superimposed the even greater growth rate of total worldwide energy demands. The results demonstrated clearly, from a statistical point of view, just how essential an abundant source of electric power is going to be to the world.
>
> If we examine the possible effect of abundant low-cost energy on developing nations, assuming that many modern technologies and the education to use them can be accrued at the time this energy is made available, we can see these developing nations making remarkable leaps into the mainstream of the 20th Century and beyond. In fact, as I will point out shortly, large nuclear energy centers may be the key to rapid development for many nations in the next few decades. . . .
>
> Let us look first at how nuclear energy might play a role in meeting one of man's most urgent problems—that of producing sufficient food to feed a rapidly growing world population. . . . Among them are land, water, seed, fertilizer, pest control, and the processing and distribution of the food. Nuclear energy can have a significant bearing on all of these. . . .
>
> [D]esalting of seawater on a large scale now appears economical through the use of nuclear power. In the United States we are about to begin construction on a dual-purpose nuclear station that will eventually generate about 1,800,000 kilowatts of electricity and distill 150 million gallons of ocean water per day. . . . However, if one thinks in terms of the large breeder reactor plants of the future, or even of large near-term dual-purpose plants. . . one can conceive of a nuclear complex producing much greater amounts of fresh water—some day perhaps billions of gallons per day at a cost of 2.5 cents per cubic meter. . . This begins to bring the cost of desalted water down to the range where it might be considered for some types of agriculture. . . .
>
> Another factor considered in this thinking is the possible economic production of large amounts of ammonia and phosphorous-containing fertilizer through the production of hydrogen by the electrolysis of water and electric furnace production of phosphorous. Motivated by these ideas, serious studies have been made . . . this past summer at Oak Ridge National Laboratory. . . .
>
> The study sees the development of large nuclear-powered agro-industrial complexes on coastal desert areas as "food factories." [T]he planning, construction, and operation of such a large nuclear agro-industrial complex would be no small undertaking and might best be done on an international basis—through advanced nations cooperating with developing countries. . . . [Such a food factory] capable of generating 1,000,000 kilowatts of electricity and desalting 100 million cubic meters or 400 million gallons of water per day . . . could support the daily production of



Artist's depiction of a nuplex, a nuclear-centered agro-industrial complex. This 1960s design was located on the seacoast for the purpose of desalinating seawater, as part of what Seaborg called a "food factory." In the "Atoms for Peace" optimism of the 1960s, it was assumed that nuplexes would be used throughout the world for development.

> 2,000 tons of ammonia and 360 tons of phosphorus. The food factory in this plant would consist of 200,000 acres irrigated and fertilized by the nuclear plant. . . . [I]t is projected that this complex could produce more than 1,000,000,000 pounds of grain annually, enough to feed almost 2,500,000 people at a caloric level of 2,400 calories per day. In addition, it could export enough fertilizer to other agricultural areas. . . to cultivate 10,000,000 more acres . . . [and provide] from 15,000,000,000 to 45,000,000,000 additional pounds of grain—enough to feed tens of millions of people at the same substantial caloric rates. . . .

Seaborg further elaborates the need for nuclear energy by describing many other projects that could be developed for the underdeveloped sector with it: Creating ports on the seacoast; new fishing industries, preserving fish with irradiation; nuclear-powered industrial complexes that can reduce iron, make steel, ferro-manganese, phosphorous, calcium carbide; using nuclear-powered electricity for electrolysis to make copper, using electrolytic hydrogen to create nitric acid and iron. He says that this can become the basis for a "self-sustaining growing economy in a reasonable number of years."

What would it take to do all this? Seaborg says:

> It would require great advance study from a technical, economic, and social standpoint. It would require a massive infusion of capital into an undeveloped area. And it would take, above all, the devotion and hard work of a great many talented people to put the plan into operation, to train operating personnel on all levels, and to establish a community that could successfully carry on such an undertaking once the initial corps of experts had left. Many people, however, envisage such a program as a potentially important step towards a lasting world peace.

Seaborg's enthusiasm does not end here, however. He continues to describe other needs for nuclear power. In one idea, he describes how nuclear power can be used to bring underground water resources to the surface for irrigation, using electrically operated tube-well pumps. He describes one study that had begun in India, in the Indo-Gangetic Plain, to bring underground water up, so that relying on monsoons for irrigation would be ancient history; the electrification of the underdeveloped villages with heating and air-conditioning; discovering ways to use radiation for pest elimination; saving trees by developing new metals, polymers, plastics, etc.; eliminating "junk" and waste by using nuclear-powered reprocessing; better ways to control and predict the weather; using nuclear-power to reach planets and other stars; better ways to develop nuclear medicine; using radiation in medicine to develop vaccines to stop disease; and ideas about radioisotope heart pumps to save lives.

aided the development of the atomic bomb by the United States by extracting polonium from old radon tubes. And Marguerite Percy became world famous in 1939, when she discovered the radioactive element francium while studying actinium.

Madame Curie's proudest moment was to see her daughter and son-in-law, Irène and Frédéric Joliot-Curie, successfully discover how to artificially produce radioactivity, when they used alpha particles to bombard aluminum. Frédéric Joliot-Curie, seeing the significance of this discovery stated that "scientists, building up or shattering elements at will, will be able to bring about transmutations of an explosive type." When Marie Curie and Paul Langevin came into the laboratory, and the couple explained what they had done, Marie was overwhelmed. Later, Frédéric Joliot-Curie said of that moment:

> I will never forget the expression of intense joy which overtook her when Irène and I showed her the first [artificially produced] radioactive element in a little glass tube. I can see her still taking this little tube of the radioelement, already quite weak, in her radium-damaged fingers. To verify what we were telling her, she brought the Geiger-Muller counter up close to it and she could hear the numerous clicks. . . . This was without a doubt the last great satisfaction of her life [Quinn 1995, pp. 429-430].

Madame Curie's legacy did not disappear with her death on July 4, 1934. One of the most magnificent, and least well-known celebrations of her life, was a scientific symposium in Warsaw, Poland, honoring the centennial of her birth in 1967. The best scientific minds of the world came together to pay homage to the woman who gave birth to the nuclear age. Despite the fact that the symposium took place in the middle of the "cold war" era, the delegations from the United States and the then-Soviet Union, gave the most magnificent tributes to Marie, and opened up a beautiful "dialogue" on the need for cooperation in nuclear research for world-development purposes.

On the Russian side, were two top Soviet Academicians: Andronik M. Petrosyants, Chairman of the State Committee for the Utilization of Atomic Energy, and Venedict Petrovich Dzhelepov, who was one of the founders of the Soviet national high-energy physics research center, and Director of Laboratory Problems from 1956-1984. Their joint speech was titled "Advances in the Development of Elementary Particle Accelerators in the Soviet Union," and in it, they describe the history and latest advances made by Soviet scientists in this field. In reverence to the memory of Marie Sklodowska Curie they said (in part):

> After the tragic death of Pierre Curie, his wife, Maria Sklodowska Curie, continued their investigations with great success. She boldly pioneered the road to the "terra incognita" of the micro-world, where everything was mysterious and unusual . . . tackled a wide range of problems, including the search for radioactive ores, the development of techniques for separating microscopic

amounts of radioactive elements and for studying their physical and chemical properties, the production of large quantities of radium . . . the performance of high-precision thermal measurements, the development of fundamentally new measuring methods and equipment, and the careful study of the properties of the various forms of radiation. . . .

Sparing no effort and sacrificing her health, Marie Curie not only increased the depth and scope of scientific research, but also ensured that her young colleagues received careful training. Frédéric Joliot and Irène Curie, outstanding scientists whose names are known throughout the world, were trained by Marie Curie. Scientific contacts with Marie Curie and her co-workers were maintained by a number of Soviet scientists: Academicians V.I. Vernadsky and D.V. Skobeltsyn, who had in their early years worked for a long period under her direct supervision in Paris; Academicians V.G. Khlopin and P.L. Kapitza; L.S. Kolovrat-Chervinsky, the prominent physicist, who had been one of her pupils; Z.V. Ershova, the well-known Soviet radiochemist, who had been a member of the scientific team established by her.

Marie Curie's services to science were greatly esteemed by the Russian people, and in 1907 she was elected corresponding member of the Petersburg Academy of Sciences. In 1928, she became an honorary member of the USSR Academy of Sciences. Soviet scientists began studying the problems of radioactivity and the atomic nucleus soon after the establishment of their young State. In the early 1920s, Academicians V.I. Vernadsky, V. G. Khlopin, and A.F. Ioffe established scientific centers for the direct study of these problems. Like Marie Curie, they foresaw the significance of such problems for the future of mankind.

It is impossible to overestimate the value of Marie Curie's services to science. Her investigations and discoveries resulted in a chain of new, fundamental investigations giving rise to a revolutionary change in ideas regarding the structure of matter. . . .

At the close of the Academicians' presentation on particle accelerators they said:

> We see this as the way to the realization of the dream of a society where people are brothers, where there are neither wars nor poverty, and where all the intellectual and material needs of mankind are satisfied. . . . In its gratitude mankind honors Maria Sklodowska Curie, a genius who devoted her entire life to science and to mankind. The memory of the great achievements of Maria Sklodowska Curie, the only person to be awarded the Nobel Prize twice, will live forever. The Polish people cherish the name of their great daughter who, in gratitude to her Polish motherland, dedicated to it her discovery of a new element, naming the element "polonium." Polish scientists are continuing the glorious traditions of their celebrated compatriot and enriching science with new discoveries. We should like, on this solemn occasion, to wish our friends, the scientists of Poland, further success in the field of creative research, bringing still greater glory to their cherished motherland.

'Nothing in Life Is to Be Feared It Is Only to Be Understood'

The American representative at the Warsaw Conference was Glenn T. Seaborg, who was chosen by President John F. Kennedy, to head the Atomic Energy Commission in 1963, a post he held through two more presidencies. Seaborg won the Nobel Prize in Physics for his discovery of plutonium and seaborgium. He worked on the Manhattan Project during World War II, and discovered a number of radioisotopes to treat cancer. In the years after this excerpted 1967 speech in honor of Marie Curie's 100th birthday, Seaborg met with his eminent Russian colleagues, Dzhelepov and Petrosyants, at various scientific symposiums, and headed the American delegation at the Flerov Laboratory of Nuclear Reactions in August 1971.

Seaborg's scientific outlook represented the very best of American cultural optimism, which is alive today in the person of Lyndon H. LaRouche, and his associates. His speech was titled: "Future Outlook for the Applications of Nuclear Science":

Courtesy of Lawrence Berkeley National Laboratory

Dr. Glenn Seaborg (center) visiting Marie Sklodowska Curie's house in Warsaw in 1967, when he was the U.S. representative at the centennial celebration of Marie Curie's birth. With him are centennial participants W. Billig and Albert Ghiorso.

I believe that we have gathered here basically for two reasons. The first is to pay tribute to the memory of a pioneer in our field, a noble lady whose contributions to chemistry, physics—and, in general, to the spirit and progress of all science-must be recalled and celebrated on this centennial anniversary. The second reason is one based on a belief that Maria Sklodowska Curie held during her lifetime—and, were she alive today, one about which I am sure she would feel even more strongly. It is the belief that we who are privileged to be scientists, to be engaged in the pursuit of universal truths, are continually obligated to share our scientific heritage and, to the best of our ability, see that our science serves the greater good of mankind. I think we are succeeding in these areas. But I also believe, and I think you will agree, that never before has there been so urgent a need for a stronger bond among the world's scientists and for their cooperative efforts in translating scientific progress into human progress throughout the world. . . .

"Nothing in life is to be feared—it is only to be understood." Here, Marie Curie a few weeks before her death.

Many years before the birth of the Nuclear Age—to which her work contributed—Marie Sklodowska Curie wrote: "Nothing in life is to be feared—it is only to be understood." Today we stand on the threshold of a new age—one in which a greater understanding and use of the nucleus of the atom and its peaceful potential could more than replace the fear in which most men hold it. It could provide a world willing to work cooperatively with an enormous and most versatile force for progress. In some respects the most remarkable thing about our understanding of the nucleus of the atom—our nuclear science—is its range of influence on other sciences and technology.

Seaborg then forecasts that "by 1980 nuclear power will be generating about 150,000,000 kilowatts of electricity in the United States" and says that "we must not overlook the potential for controlled fusion" (see box, p. 64).

In his final remarks in Warsaw, Glenn T. Seaborg said:

> Finally, let me add this thought concerning the internationality of science and man. This is a belief that Maria Sklodowska Curie held strongly and one that I think is shared by this symposium. All of what I have projected today that is hopeful and could advance the progress of mankind—all this and so much more—could be realized and perhaps sooner than we think, if we in science could effect one "human breakthrough"—if we could somehow convince our fellow men that we now live in an age when fear, mistrust, and blind passions based on and regenerated by past ignorance and error must give way to a new ideal of understanding and reason among men. We live on the threshold of a new age made possible by the pursuit of—above all—truth. That pursuit has carried man with an ever-quickening pace through centuries of darkness. Now the light of truth glows brighter than ever. It is a beacon that shines into the future —a future that can be our own choosing. We must not turn our backs on that possible future. We as scientists and citizens of a greater community of man must help our fellow men to see the light. Maria Sklodowska Curie said: "Nothing in life is to be feared—it is only to be understood." Now is the time to understand more—so that we may fear less.[2]

Marie Sklodowska Curie's entire life's work is the story of the passion to discover scientific truth for the betterment of mankind. It is a life filled with self-sacrifice, curiosity, creativity, and love for humanity. It is little wonder that the scientists at the Warsaw Symposium, who came together to honor her life's work on her 100th birthday, had such praise for her as a scientist, and as a human being. It is aptly expressed in the ideas that they speak of, and their unbridled optimism to use scientific discovery to transform the physical universe.

Her life, in particular, her two visits to the United States, where she was revered by Americans, men and women alike, should serve as a reminder to us, that we, as a nation, are a much better people than we now show ourselves to be. Her life should serve as an inspiration, and a reminder to us that we need to turn to scientific truth, and fight for cultural optimism in this time of crisis. This is the best way to honor her memory, in this 100th anniversary of the first Nobel Prize she received. Americans, at their most magnificent, have been a people of great generosity, not simply with their wealth, but with their spirit for discovery and technology. We can no longer afford to be a "little people," and a people filled with terror for the unknown. An American who thinks like that could never have built this nation, nor set foot on the Moon.

We must begin to use our collective creative imagination to solve the problems besetting the world. We have to envision what the world should look like, and then do the hard work to make it a reality. As Pierre Curie wrote in his personal journal at the age of 21, in 1880: ". . . one must make life into a dream and make the dream into a reality."

Denise Ham is a long-time associate of Lyndon H. LaRouche, Jr.

2. These speeches are excerpted from the *Marie Sklodowska Curie Centenary Lectures, Proceedings of a Symposium*, Warsaw, October 17-20, 1967, Organized in Poland by the Marie Sklodowska Curie Centenary Committee in cooperation with the Atomic Energy Agency and UNESCO, Published by International Atomic Energy Agency (Vienna, 1968).

Acknowledgements

I would like to thank many of the people who helped in this article: Robert Hux, Ph.D., Chemistry; Paul D. Frelich, retired electrical engineer; Dr. Jonathan Tennenbaum, *Fusion* Magazine, Wiesbaden, Germany; Marsha Freeman, Marjorie and Larry Hecht, *21st Century Science & Technology;* Translators Edward Carl, Anna Kaczor Wei, Laurence Rebello, and Wanda Bolonowska, Ph. D., retired biochemist, Roswell Park Cancer Institute; Librarian, College of Physicians, Philadelphia, Pa.; the librarians at Columbia University, Rare Book & Manuscript division; Danelle Moon and others at the Yale University Manuscripts and Archives; Rachel Brew, Research Librarian, Buffalo Museum of Science. Special thanks to the librarians at the University of Buffalo at Amherst and City of Buffalo Library, Rare Books; the Wellcome Institute for the History of Medicine, London; Bryn Mawr College Library; the Polish Museum of America, Chicago, Ill.; the Ohio Historical Society; the Library of Congress, Washington, D.C.,; Northwestern University Library; Smith College Library; Vassar College Library; University of Chicago Library; St. Lawrence University Special Collections & Archives; the City of Boston Public Library at Copley Square. And very special thanks to the Thomas Crane Public Library, Quincy, Massachusetts.

Others to be thanked are John Wheeler for research at Yale University; Leni Rubinstein, Dennis Speed, Richard Black; Bill Ferguson, John Basar, Gary Kanitz, Therese Mallory, Lamar Pittman, Helga Zepp-LaRouche, Brian Lantz, Rosa Tennenbaum, and Roger Ham for critical assistance.

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Notes

* Can be accessed on the internet

An Interesting, But Flawed Solar History

by Howard C. Hayden

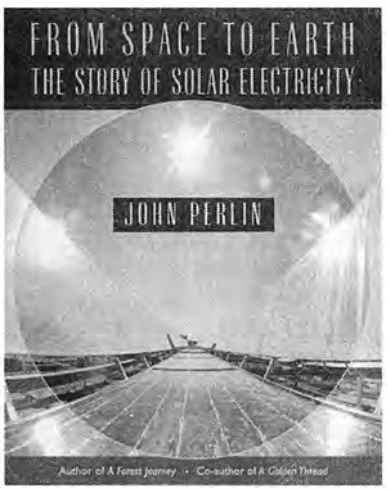
From Space to Earth:
The Story of Solar Electricity
by John Perlin
Cambridge, Mass: Harvard University Press, 2002
Paperback, 224 pp., $22.95

John Perlin's book is a history book, not a science book. The first chapter sets the stage by describing historical solar heat projects, including those that are designed to produce electricity. He says rather dramatically, "This technology uses trough-shaped reflectors that look hauntingly similar to the parabolic troughs Frank Shuman built in Egypt seventy years earlier." Hauntingly? Perhaps Mr. Perlin's algebra book had a touchy-feely chapter on conic sections.

Aside from such attempts to substitute Steven-King science into the picture, Perlin's book is actually an interesting review of the history of photovoltaics. He provides details of the 1860s discovery of the photovoltaic effect in selenium and of the improvements in efficiency that have occurred since. The details, however, are very superficial. Perlin makes no mention of the relationship between wavelength and photon energy, no mention of band-gaps, no mention of recombination, and certainly no mention of why a broad spectrum of light cannot efficiently do the quantum process required to produce electricity.

"The story" is mostly a story of people, not of the science of photoelectricity. Throughout the book, one senses the author's belief that photovoltaics will be our energy salvation. He says, "Photovoltaics is on the threshold of becoming a major energy source." Yet, a more astute author would be able to see the shortcomings. Virtually every chapter is about the use of solar energy when no other source is available.

The one exception is Chapter 13, "Solarizing the Electrified," which gives examples of the use of solar cells in regions where electricity is available.



Whatever the title, the chapter is about massive subsidies. (Gasoline could be made free with enough subsidies.)

One sentence in Chapter 13 caught my eye because of its multifaceted errors: "Putting photovoltaics on buildings where electrical networks exist eliminates the cost of storage." The proximity eliminates most of the cost of transmission.

What Perlin is actually comparing (but without being able to say it clearly) is remote applications, that do require storage, with utility-fed applications, that do not require storage. Putting solar cells on a factory does not eliminate the cost of storage for the remote location. That is, if a remote farm needs a bank of batteries to store electrical energy, the cost of storage for that location is not abated by putting photovoltaic cells on a factory in Dallas.

Worse yet, Perlin seems oblivious to the meaning of "where electrical networks exist." Without that backbone of an electrical grid powered by serious power sources, the photovoltaic cells, *sans* backup, would be essentially worthless. One can dream, perhaps, of billions of lead-acid batteries (after a century, still the best choice of battery for stationary applications), produced by hundreds of times more lead mines than have ever existed. But it's only a dream, for there is no conceivable storage system that could handle a photovoltaic world. Those little cells can do wonderful things, but running an industrialized giant is not one of them.

A caption of a picture of a satellite says, "Solar cells not only provide electricity for satellites, they also provide the power that propels space vehicles." Anybody who could write such nonsense is a good candidate to be flipping hamburgers—perhaps with the Harvard University Press editors.

Howard C. Hayden, Ph.D., publishes The Energy Advocate *newsletter (http://www.energyadvocate.com) and is the author of* The Solar Fraud.

KOREAN NUCLEAR COMMISSIONER DR. CHANG-KUN LEE

'A Nuclear Perspective from Asia'

To celebrate the 60th anniversary of the first controlled fission reaction, achieved by the famous Chicago Pile during the wartime Manhattan Project, the American Nuclear Society sponsored a special session at its annual meeting Nov. 20, 2002, in Washington, D.C. The speakers were diverse, but the thrust of the presentations was universal: The world needs more nuclear power.

The role of Asia in generating a nuclear renaissance was the subject of the speech of Dr. Chang-kun Lee, a Commissioner on the Atomic Energy Commission of South Korea, and chairman of the International Nuclear Societies Council.

This is an abridged version of Dr. Chang's speech.

Marjorie Mazel Hecht/21st Century

Chang-kun Lee: "Asia is keeping alive a 'nuclear technology shelter,' keeping the flame burning and know-how alive for the forthcoming nuclear Renaissance."

In the ancient Far East, a man was adjudged to have had a full life when he reached the age of 60. When he or she reached 60, there was a big party of celebration held in his or her honor called *whan-gap*. Literally *whan-gap* means to have circled around and returned to the original point and time—to have gone through a full cycle of life. The practice of *whan-gap* is still very common throughout East Asia, including Korea, China, and Japan. On this special occasion of the 60th anniversary of man's first controlled nuclear chain reaction, I would like to offer my congratulatory *whan-gap* greetings! My, how far we have come in the last 60 years!

In Retrospect

It will not be a large exaggeration to say that the history of mankind in the last century has been mainly a nuclear one. . . .

History is, of course, fraught with interpretation; it is more than a mere collection of facts, and this is so especially when it comes to discussions of such weighty matters as the future fate of mankind. In the middle part of the last century, many public-spirited intellectuals were stricken with grave worries about the impending Armageddon, about mankind extirpating itself in an orgy of an all-out nuclear war. Fortunately for us, such an exchange did not occur, or maybe it could not, *not* because of the high moral standard of world leaders or because of pacts they might have signed, but simply owing to the obvious primal human fear of a world war that would have been fought with tens of thousands of nuclear warheads, causing untold and insupportable destruction on both sides. . . .

Thus, in the post-World War II era, world peace and stability were just scarcely maintained under the constant shadow of the menace of total annihilation from use of nuclear weapons.

On the other hand, nuclear energy was harnessed for electricity-generation, and supplied 17 percent of the world demand in the 1990s. . . . In addition, radiation and radioisotopes have been put to practical use for improving the quality of life in many areas. Thus, over the years, nuclear energy continued to exhibit its often dual nature—its construction and destructive aspects, and its accessibility to good uses as well as for nefarious purposes.

Asia and Nuclear Power

The continent of Asia embraces the biggest landmass in the world and is home to more than 60 percent of the world population. Asia is where the world's first cities started—in Mesopotamia, in the Indus Valley, and in China. A late starter in terms of modern economic development, Asia is awaking finally from a long hibernation and currently enjoys a rapid rate of economic growth, a faster rate than other regions of the world. The affluent life-style pursued by Asians can only come to fruition with the timely supply of infrastructure necessities, including, importantly, electricity.

According to the International Energy Agency's World Energy Outlook, the Asian share in world energy demand will increase from 31 percent in 1997 to 41 percent in 2020. The energy demand increase, in China *alone,* will match the expected increase in OECD countries.

Asia accounted for 14 percent of the world oil demand in 1971. Today, its share has doubled to 28 percent, and it is expected to increase to 35 percent by 2020. Since oil production in the region is declining, all the incremental oil will have to be met by imports, mostly from the Middle East. . . .

Ten major developing economies in Asia (China, Chinese Taipei, Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand) achieved a 7.7 percent annual average GDP growth in 1990-1997, and their primary energy consumption grew by an average 5.6 percent per annum in the same period. In 1997, the primary energy consumption in Asia was 1,659 million Tons Oil Equivalent, which consisted of 54 percent coal, 22 percent hydro and renewables, 15 percent oil, 7 per-

cent natural gas, and 2 percent nuclear. The preponderance of coal derives from heavy dependence on domestic coal in China and India. Excluding these two giants, the primary energy consumption of the remaining eight Asian economies was filled mostly by oil, whose share was 60 percent.

On the other hand, oil *production* by these 10 Asian economies stood at 1,406 million Tons Oil Equivalent, which was 253 million Tons Oil Equivalent less than the consumption.

Consequently these countries are exposed to significant security risks associated with the politico-military, transport, foreign exchange outflow, and environmental aspects of oil import, especially from the Middle East.

The rapid industrialization, urbanization, and motorization taking place in Asia will further deepen the dependence on—and the degree of risk exposure to—oil imports. In order to minimize these risks, these Northeast Asian countries, Japan and Korea in particular, have pursued the option of expanding their natural gas infrastructures, and steadily increasing their Liquefied Natural Gas imports. . . .

According to forecasts by a well-regarded economic institution, developing countries, many of them in the Asian region, will need several *hundred* gigawatts of additional power generation and transmission facilities in the upcoming decade, to support their levels of socio-economic development. . . .

Plutonium—Double-Edged Sword

How plutonium is viewed is a complicated and tricky issue, especially when non-technical, socio-political aspects enter into the equation. Many anti-nuclear radicals paint a dark picture of plutonium as inherently evil. . . . As somebody has colorfully put it, their anti-nuclear attitude NIMBY ("Not in My Back Yard") has given birth to BANANA ("Build Almost Nothing Anywhere Near Anyone") which has spawned NOPE ("Not on Planet Earth"). . . .

As we know, Pluto in the ancient Graeco-Roman world was the god of the dead and ruler of the underworld. Pluto was also known by the names Hades and Tartarus. By its very name, therefore, plutonium conjures up images of ruin, death, and bad luck. . . .

Marjorie Mazel Hecht/*21st Century*

French nuclear pioneer Georges A. Vendryes reminded the American Nuclear Society audience of his announcement at their meeting 30 years ago of the discovery of the natural reactor in an African uranium mine, which had operated—safely—for 2 billion years. There are "endless opportunities for man's ingenuity," he said. "A half-century ago, the torch was lit by Fermi, and it's our responsibility to keep it sparkling and hand it on to future generations with pride."

In the Roman and Hellenistic world, the word *'o ploútos* also meant wealth and riches, a materialistic abundance, and even happiness and an implied bright future, as is clear from many passages in the New Testament, which was written in Greek. . . . The reason that Hades was called Pluto or Pluton (the Wealthy One or the Giver of Wealth) was that he gathered all living things into his treasury at death. Since no living thing could escape death, Pluto was wealthy indeed! Moreover, the world under us was not only rich with veins of mineral deposits, but it was believed also to sprout out trees, flowers, grains, and plants in general—in short, the underworld was a large storehouse of all forms of wealth.

Thus we see that even in the ancient world, Pluto was a doubled-edged sword, a conflicted term—Pluto was the god of the dead and ruler of the Netherworld, but *ploutos* also signified the riches and material well-being.

To our extreme regret, the morbid rather than the rosy view, has tended to suffuse contemporary public discussions of plutonium. Much misinformation and even misguided indoctrination directed at the general public has meant that the true nature of plutonium has often been little understood or appreciated.

Plutonium is but a common chemical element, a heavy metal with fissionable and radioactive characteristics. Yet, during the turmoil of the 1970s and 1980s, this physical substance was subjected to a barrage of heavy and emotionally charged attacks. Political maneuvering entered the new techno-nuclear arena and sought to upend the fate of plutonium utilization. We all know that without the activation of its back-end aspects, the nuclear fuel cycle became hemiplegic, as plutonium utilization was increasingly abandoned. . . .

In our view, plutonium is akin to gold, the precious metal, in that it brings us "*ploutos*" and is able to deliver on its promise of enhancing our well-being and prosperity. . . .

The discovery of plutonium opened, in Glenn Seaborg's words, "the dawn of a new era," and prefigured man's ability to control nature in a profound way, at the level of the very constitution of matter itself, in fact. . . .

In reality, wealth is a mixed blessing. Material wealth and technical capability, coupled with public morality, can work synergistically to drive the wheels of human civilization and achievement, and enhance societal well-being. Abuse, however, can lead us quickly to ruin.

The Roman Empire, for example, enjoyed a continued preeminence and prosperity in the Classical world, so long as its affluent ruling class fulfilled its moral obligations and led a life of *noblesse oblige.* The great empire, however, fell into disarray and ruin with the corruption of the wealthy upper classes whose abuse of their power and prerogatives spelled the end of the Classical era. From *ploutos* to Hades was but a short step.

What we need in the next 60 years is a grand revival. Just as the Italian Renaissance sprang anew from the humanistic traditions of ancient Greece, so must we restore the original and uncorrupted promise of *ploutos* in plutonium. It must be an historical mandate

for us not to direct plutonium down the ruinous path of nuclear warfare and mass destruction, but rather work tirelessly towards enhancing its wealth-generating properties, towards using plutonium as a reliable and stable supply of energy that is pollution-free. We must steer plutonium from death (*thanatos*) to wealth (*ploutos*). . . .

The Forthcoming Renaissance

As the first 60 years of the nuclear era draw to a close, a dark shroud hangs over its public image. The perception among some circles is that "nuclear" belongs in the same company as "the axis of evil." It falls upon us, nuclear alchemists, in the next 60 years to correct this tarnished image and demonstrate to the world the true nature of "nuclear"—a royal elixir, to heal a planet afflicted with pollution, and hungry for power, energy, and medical care.

Asian nuclear experts are convinced that the nuclear community should employ its effort all the more for the development of next-generation reactors, plus associated optimal fuel cycles, in addition to concretizing viable nuclear systems for the production of cheap and abundant hydrogen to replace oil and gas, and also for desalination.

For some Asian countries, the development and deployment of nuclear power reactors came as an inevitable response, in trying to escape the grip of oil, and to fuel rapid economic growth, while mitigating environmental devastation left in its wake. In Asia, 96 power reactors are currently in operation, meeting merely 2 percent of the total energy demand. Seventeen units are under construction, while 19 other units are in various planning stages. Despite their willingness, many developing Asian countries have been unable to embark on nuclear power projects, due to shortcomings in technology, in manpower, and in financing capability. . . .

As far as power reactor deployment is concerned, the advanced nations bounded out of the starting line, and hopped sprightly along at the pace of a rabbit, while we Asian countries plodded along at the slow crawl of a turtle. At the moment, however, the Western nuclear rabbit is taking a nap under a roadside tree (hung with limp moratorium banners) while the Asian nuclear turtle is still toddling along on the road carrying the nuclear seed.

You could say that Asia is keeping alive a "nuclear technology shelter," keeping the flame burning, and the know-how alive, for the forthcoming nuclear Renaissance. Surely, some day (when the rabbit finally awakes from its Rip Van Winkle-like snooze), these former students of nuclear technology in Asia, will be ready to pay back their previous teachers in the West, with state-of-the-art technical know-how, and new or next-generation hardware.

It is because they are *not* endowed with natural resources, that many Asian countries have been obliged to go nuclear. If I may take the liberty of depicting the situation in terms of the Sermon on the Mount:

- Blessed are the poor in energy resources; for theirs is the haven of nuclear technology.
- Blessed are the meek nuclear professionals; for they, through the dint of their work, shall inherit a clean Earth. . . .

Years ago, the great Indian poet and the first Asian Nobel Laureate (1913) Rabindranath Tagore wrote:

> In the golden age of Asia
> Korea was one of its lamp-bearers;
> And that lamp is waiting to be
> lighted once again
> For the illumination in the East.

Tagore wrote these lines some 100 years ago when, indeed, there wasn't much illumination, electric or otherwise, in East Asia. How prescient Tagore was! These days, all of the Far East is bubbling with economic and technological activity and all of our cities, from Busan and Bangkok and Beijing and Bangalore to Seoul and Shanghai and Sapporor and Singapore, are brightly lit at night.

> Permit me, therefore, to conclude
> my talk by rephrasing Tagore:
> In the golden nuclear age
> Asia benefited, her lamps were lit;
> And these nuclear lamps are waiting
> to be fueled once again by Asians
> For the illumination of the entire
> world and the life extension of
> human civilization,
> For the well-being and welfare of
> our grandchildren, and
> For the safety, security, sustaining,
> and survival of the great-great-
> grandchildren of our
> grandchildren.

Letters

Continued from page 3

opponents to the plan to save the world economy. A good discussion of the Vernadsky-LaRouche concept of the Noosphere and its relation to the Biosphere, and the necessity of the Noosphere's dominance of the Biosphere for the survival of the Biosphere would be very useful. Additionally, an attack on preservationism, with Heraclitus as the alternative, seems to be to be a good flank to hit. And of course, a discussion of the supreme value of human life and an attack on animal rights would be good.

Monroe Eskew
Houston, Texas

The Editor Replies

We'll see what we can do. Meanwhile, we have addressed these issues, separately or combined, in a number of past issues of *21st Century* and special reports. The index on the *21st Century* website of past issues by subject can be used to find these articles.

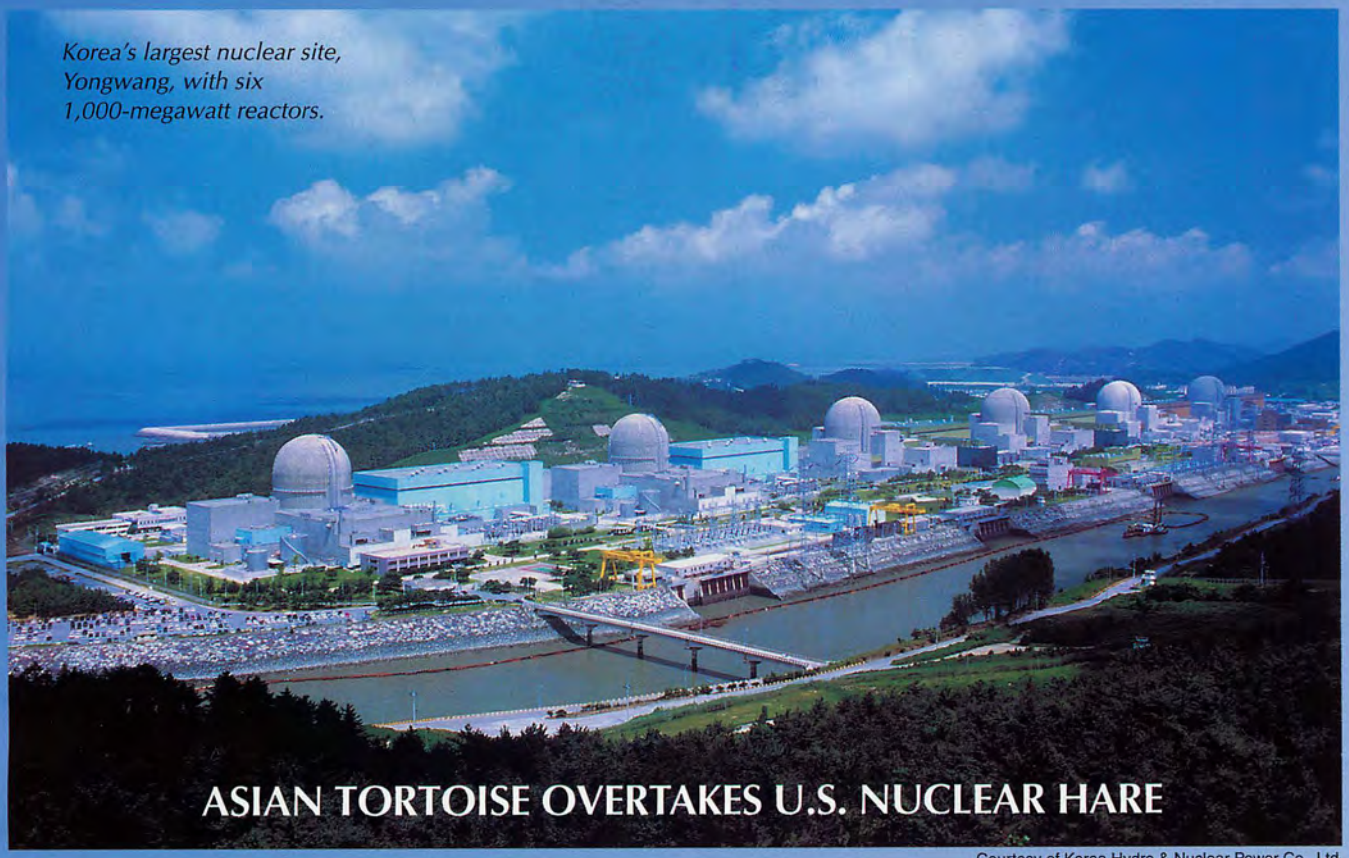
In the *The Coming Ice Age: Why Global Warming Is a Scientific Fraud,* we address the scientific matters and expose Prince Philip's Eco-fascist SS. in a collection of 18 articles. This 100-page Special Report from November 1997, is available now for $25.

An original work of Vernadsky (translated from the Russian), discussing the distinction of living from non-living matter, appears in the Winter 2000-2001 issue. In a five-part feature in the Summer 2001 issue, "Bring Science Back to Life," five authors address the topic as well.

Our Spring 2001 issue, headlined "The New Nuclear Power," attempted to answer the antinuclear fearmongers with a solid review of the facts.

Our Fall 2002 issue was devoted to the subject "Bring Back DDT," and a collection of other articles exposing Rachel Carson's hoax is described on our website home page.

Back issues are available for $5 each ($8 foreign). All items can be purchased through our website www.21stcentury-sciencetech.com, or by mail from *21st Century,* P.O. Box 16285, Washington, D.C. 20041.



Korea's largest nuclear site, Yongwang, with six 1,000-megawatt reactors.

ASIAN TORTOISE OVERTAKES U.S. NUCLEAR HARE

Courtesy of Korea Hydro & Nuclear Power Co., Ltd.

Courtesy of Korea Hydro & Nuclear Power Co., Ltd.

The Ulchin site, which has the first two Korean standard nuclear plants in operation, and two units under construction.

Korean Atomic Energy Commissioner Dr. Chang-kun Lee's speech to the American Nuclear Society's special session, commemorating the 60th year of nuclear fission, aptly characterized the Western nuclear industry as a rabbit taking a nap, while the Asian nuclear turtle keeps on moving. "Surely some day," Dr. Chang says, "when the rabbit finally awakes from its Rip Van Winkle-like snooze," the former Asian students of Western technology will be ready to pay back their teachers with the latest know-how.

South Korea currently operates 17 nuclear power reactors, supplying 39.3 percent of the total electricity demand for the nation. Three 1,000-megawatt reactors are in construction, with eight more planned by 2015. This means that Korea will put on line almost one new power reactor per year, until that date.

In This Issue:

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Marie Sklodowska Curie around the time of her first Nobel Prize, 1903.

A NEW LOOK AT THE LIFE OF MARIE SKLODOWSKA CURIE

"Discovery itself, is an issue of 'passion,' " writes Denise Ham, in her new study of the life and work of Marie Sklodowska Curie. Madame Curie (1867-1934) has inspired many generations around the world. In this unique biographical investigation, the author proves that the search for truth, nearly always painful and difficult in its time, is an immortal act in its power to inspire generations to come.

Library of Congress

UNITED STATES OF AMERICA
Department of Commerce
Bureau of Standards - S.W. Stratton, Director

CERTIFICATE
FOR
RADIOACTIVE MATERIAL

Submitted for measurement and certification.

By the Radium Chemical Company, Pittsburgh, Pa. Distributors — For the Standard Chemical Company, Pittsburgh, Pa. Makers

And presented by
THE PRESIDENT OF THE UNITED STATES OF AMERICA
ON BEHALF OF THE WOMEN OF AMERICA
to
Madame Marie Sklodowska Curie,
Paris, France.
May 20, 1921

This certifies that each specimen of the above mentioned radioactive material, as described below, has been compared with the Radium Standard of the National Bureau of Standards, and that from the data so obtained the equilibrium intensity of the measurable gamma radiation has been computed to be equivalent to that from a quantity of radium whose mass is specified in the right hand column of the following table of values.

Designating numbers of tube*		External dimensions of tube (millimeters)		Combined weight of tube and contents (milligrams)	Computed radium element equivalent* (milligram)
Assigned by maker	Assigned by the Bureau of Standards: Serial / Test	Length	Diameter		
1	4082 / Tex.R.302-40	41.9	3.77	554.7	100.7
2	4083 / "	38.0	3.66	465.3	101.3
3	4084 / "	38.5	3.72	541.8	100.9
4	4085 / "	40.5	3.82	552.6	101.0
5	4086 / "	38.5	3.76	517.7	100.9
6	4087 / "	37.7	3.74	537.5	100.5
7	4088 / "	38.0	3.62	479.3	101.2
8	4089 / "	39.8	3.81	505.6	100.7
9	4090 / "	39.4	3.81	546.3	101.1
10	4091 / "	38.6	3.78	462.8	101.0

The computed radium element equivalent specified in the right-hand column represents a quantity of radium in equilibrium with its first four derivatives, being hermetically sealed in a tube of Pittsburgh plate glass having walls 0.27 millimeters thick.

The residual uncertainty in the numerical value of the radium element equivalent of these several specimens does not exceed 0.7 of one percent.

Observations extending over 25 days indicate that the radium contained in these specimens is used in radioactive equilibrium.

S.W. Stratton
Director

Curie with President Warren G. Harding at the White House, May 20, 1921. Inset is the U.S. Bureau of Standards certificate for the gram of radium bought for Curie by "the women of America."

Roger Ham

Author Denise Ham and engineer Paul Frelich, with a modern version of the quartz piezo-electrometer used by Pierre and Marie Curie.