AUSTRALIAN ALMANAC

Educating the Mass Strike: Cosmic Radiation beats Green Fascism

Pierre and Madame Curie

By Gabrielle Peut Part 4 of 4

On the strong insistence of Marcelin Berthelot, (chemist and member of the French Academy of Sciences), of Paul Appell (Dean of the faculty of Science at the University of Paris, known also as Sorbonne University) and Vice-Rector Laird (Sorbonne University), the public authorities made a generous offer on May 13th, 1906, as the council of the Faculty of Science unanimously decided to maintain the chair created for Pierre Curie and to appoint Marie to that position. The University of Paris made its announcement: *"Mme. Pierre Curie, Doctor of Science, chief of research work in the Faculty of Science of the University of Paris, is charged with a course in physics in the said faculty. Mme. Curie will receive in this capacity an annual salary of ten thousand francs, dating from the first of May, 1906."*

This was the first time that a position in French higher education had been given to a woman.

In the second to last entry in her diary, following her appointment to the University, she recorded what she had spoken to Pierre at his graveside: "You would have been happy to see me as a professor at the Sorbonne, and I myself would have so willingly done it for you. But to do it in your place, my Pierre, could one dream of a thing more cruel. ... I really feel that all my will to live is dead in me, and I only have my duty to bring up my children and also to continue on the path I have accepted. Perhaps, also to wish to prove to the world and especially to myself that the one that you have loved so much really has some value."

These are not just words! Her entire life was always committed selflessly to science for the betterment of mankind, and here, in her darkest hour, she made the decision to continue her own and Pierre's work. She confronted death with the strength of a person who self-consciously knows that she can change the course of history for the better. Fraught with the deep grief, where she had sunk for a while to a lower level of consciousness and self-pity, she was able to rally that original purpose of her mission and she evoked her old strength. She acted on the level of the Sublime. Marie chose to have victory over death because of what she and Pierre had done with their lives; she accepted, and she chose to allow something that was higher, more noble than one's ordinary sense of self, to speak to her – and that was God.

The Recovery

Now a professor at the Sorbonne, Marie buried herself in her work to prepare several decigrams (1/10 of a gram) of very pure radium chloride. By 1907 she determined a new atomic weight of radium, and, incredibly, by 1910 she was able to isolate the metal. The operation to do this is extremely delicate because you are talking about such minute samples that it can be lost very easily. In fact, Marie was never able to isolate polonium, because the quantity in the pitchblende is far less than the quantity of radium. At this point she decided to follow through on what Pierre had been demanding for years— to establish their own laboratory. Barely four months after Pierre's death, she demanded that the Sorbonne live up



Radium Institute

to its promise of providing a new laboratory, or else she would resign and join the Pasteur Institute.

Professor Claude Regaud of the Pasteur Institute, a longtime friend of the Curies, offered Marie a position there, as he was directing the research into the medical uses of radioactivity, a field known as Curie-therapy in honour of their work. However, With Regaud's prompting, the Institute Pasteur, and the Sorbonne University decided to join forces to build a large laboratory for Marie Curie – the Radium Institute, and was finally completed by Aug 1914. The Radium Institute was erected a few streets away from the "shed" at the School of Industrial Physics and Chemistry where Pierre and Marie Curie had discovered polonium and radium in 1898.

The dream of Marie and Pierre had been to create a worldclass institution, an Institute of Radium, with two laboratories, one for physics and one for biology. The former would be devoted to study of the physical and chemical properties of the radioactive elements, and the second lab to studying the biological and medical applications. Under Curie's direction the Radium Institute became a world centre for the study of radioactivity, and no doubt became an issue of much concern of those circles around, the Darwin Project, as it was claimed that one of the few centers that were on the same level as the Radium Institute, included the Cavendish Laboratory in Cambridge, England.

In the short 12 month period after Pierre's death, Marie seemed to fly to new heights. She set the international standard for the atomic weight for radium chloride, at a very contentious meeting of the *World Congress on Radiology and Electricity* in Brussels. Radium's growing use in medicine, industry, and research had made it vital to have a uniform measurement for the element, and the aim of the congress was to have an International Radium Standard. The world congress adopted the word *Curie* for the measurement. Marie then responded, that if the measurement was to be "*Curie*", she must be allowed to determine the weight.

After more arguments, her definition was adopted and she was appointed to "prepare the primary standard." As she





ATTACKS THE RADIUM SCHOOL

Prof. Armstrong Says It Has Cast Scientific Caution to the Winds. LONDON TIMES-NEW YORK TIMES

Special Cable. Copyright, 1908.

LONDON, Friday, Aug. 10 .- Prof. Henry E. Armstrong vigorously supports Lord Kelvin's protest against the proposition submitted to the British Association that the production of hellum from radium has established the fact of the gradual evolution of one element into others. Prof. Armstrong, in a letter to the editor of The Times, says:

"The thanks of the public are due to Lord Kelvin for his protest against the conclusion being drawn from the evidence at present before us that it is proved that there is a gradual evolution of one element into others. No one has yet handled radium in such quantity or such manner that we can say what it is precisely. That helium can be obtained from radium appears proved, but no proof has yet been given that it is not merely contained in it.

"There was a time when the expression 'scientific caution' meant the highest degree of caution, and it was supposed to be an attribute of workers in science. Workers in the radium school appear to have cast caution to the winds and to have substituted pure imagination for it. Among ourselves we should always be at liberty to postulate the most crack-brained hypotheses, to dream the wildest dreams, as a means of guiding inquiry, but we should not court popularity on such a basis. By so doing we lose all claim to guide public opinion."

The New Hork Eimes

Published: August 10, 1906 Copyright C The New York Times

later explained, "was a very delicate operation, as the weight of the standard sample, quite small [21.99 milligrams of pure radium chloride] had to be determined with great precision. It was accepted by the Commission and deposited in the International Bureau of Weights and Measures at Sevres. near Paris."

The Commission, which was made up of 10 scientists that included Marie, finally agreed!

After returning to Paris, she then offered her candidacy for the single vacant seat for a physicist in the French Academy of Sciences, one of the most prestigious scientific organizations in Europe. She was not accepted into this all-male bastion. What? A woman trying to invade? Holy Dooley, sparks flew at that meeting. There were 163 members of the Institute de France, the umbrella organization repre-

KELVIN'S STAND DEFENDED.

His Dissent in Radium Controversy Is Upheld as Well Grounded. LONDON TIMES-NEW YORK TIMES.

Special Cable. Copyright, 1906. LONDON, Saturday, Aug. 18 .- The Times comments editorially this morning on the radium controversy aroused by what it considers a too facile acceptance by the British Association of the proposition that the evolution of one element into others is an established fact.

The Times objects seriously to Sir Oliver Lodge's attempt to dispose of Lord Kelvin's dissent from the proposition, by intimating that Lord Kelvin was not qualified to express an opinion touching upon elemental transmutation, inasmuch as he had not read what its advocates had submitted to the British Association.

The Times says that it is ridiculous to suggest that Lord Kelvin would offer in print an opinion that was not fully considered and well grounded. It adds:

" It has become the fashion to accept the transmutation of the elements, and various workers are vying with one another in spinning cobwebs about it, without having bestowed upon the facts anything like the amount of critical industry required to give their novel theories validity.

"The thing corresponds to a certain attitude of mind common among scientific people at the present day. But subjective satisfaction is one thing, and conclusive procof is another. Lord Kelvin does not find the proof. It is pure assumption that he does not know what others think of the evidence, and it is not a very courteous assumption."

DR. W. V. WHITE ARRESTED.

Alienist Consulted in Thaw Case Held for Grand Larceny.

Dr. Whitman V. White, one of the oldest doctors of Harlem, was arrested yesterday afternoon in Pittsfield, Mass., on a warrant charging him with grand larcony. Detective Sergeant Farley made the arrest and brought Dr. White back to New York. He was held at Police Headquarters

Dr. White, who is 72 years old, is the head of a large family, and a member of the Board of Managers of the Manhattan State Hospital. He was a surgeon in the United States Volunteer Corps in the Spanish-American War. He was con-sulted by ex-Judge Olcott in the Thaw case as an alienist.

The warrant charging grand larceny was sworn to by James O. T. O'Sullivan of 740 East 180th Street. Dr. White, according to Detective Farley, was guardian of the heirs of the James O'Sullivan estate. As these heirs came of age he settled with them. The time for a settlement with James O. T. O'Sullivan, who made the complaint, arrived last April, and Dr. White was instructed by the Surrogate to pay over to him \$2,983. The doctor paid \$1,500, but falled to pay the doctor paid \$1,000, but taked to pay the rest. Two months ago he went to Pitts-field, stopping at the Wendell House. He was apparently on a vacation, and was well supplied with funds. Dr. White is also wanted on a charge of contempt of court, this charge growing the follows to obsy the order of the

out of his failure to obey the order of the Surrogate.

> The New Hork Times Published: August 18, 1906 Copyright © The New York Times

senting several academies. They not only voted Marie's application down, but they took a vote on whether a woman would ever be admitted! They voted 90 to 52 to bar them for eternity!

No matter, by 1911 she was the first woman to win the Nobel Prize for Chemistry, and the first person ever to win a Nobel prize in two different fields of science.

Marie Curie was harassed by vindictive scandals, and she came under attack from leading figures of the Darwin Project, including Lord Kelvin and Henry E. Armstrong.

Armstrong was a chemist strongly influenced by Thomas Huxley. One of the focuses in his chemistry work was acids. Armstrong attempted an "acidic" attempt at refutation of Marie's ideas, in defense of Lord Kelvin's "heat death" doctrine as the inevitable future of the universe.

The London Times, echoed by the New York Times, also published pro-Kelvin editorials in the summer of 1906, just months after Pierre Curie's death. This was a signal from the establishment that Marie was to be gone after. They attacked the Curies' discovery that the radioactive elements polonium and radium could be transformed into other elements. This was not only a major revolution in the theory of the atom, but it was also the discovery of a universal principle which characterizes the Cosmos. Whilst Lord Kelvin had come sniffing around to seek Pierre Curie's approval of his work at the turn of the century, he obviously now felt brave enough to publically take on Marie via his friend and defender, Armstrong.

But first the London Times and New York Times run an editorial piece:

The Aug. 18, 1906 London Times and New York Times ran the following editorial opinion:

The Editorial starts: "that it is ridiculous to suggest that Lord Kelvin would offer in print an opinion that was not fully considered and well grounded" And then the Editorial adds: It has become the fashion to accept the transmutation of the elements, and various workers are vying with one another in spinning cobwebs about it."

The ones arguing that "transmutation of the elements" takes place, meaning the changing of one element into another, were the Curies. With such an international debate now out in the open, Kelvin personally came out in the Aug 24, 1906 edition of the London Times - New York Times and issued the following Newtonian outburst in response to a request to explain the existence of radium in the Earth:

Second Letter: Aug 26th 1906: Headline: Kelvin on Radium's Origin

"[B]y the concourse of atoms and interatomic motions from the time when the ponderable matter of the solar system and the stars existed as separate atoms scattered through the ether ... "Kelvin then continues: "It seems to me fairly probable that the atoms of he-



But a Distinct Element in the Sense Attached to it by Chemists.

DISCUSSES RAMSAY'S WORK

Belleves Atoms of Radium Undergo Spontaneous Transformation, One of the Products Being Helium.

Special Cablegram.

Copyright, 1907, by THE NEW YORK TIMES CO. PARIS, Aug. 17.-Mme. Curle has just made one of her rare atterunces on radium. She resisted all endeavors to obtain her opinion on Sir William Ramsay's reported transmutation of copper into helium, but she has written an interesting reply to François Laur, the French scientist, who questioned Lord Kelvin's assertion before the British Association that radium was a compound body comprising previously known elements. Mme. Curie writes: " Concerning the formation of hellum through radium emanations, I am inclined to share the opinions of Profs. Ramsay, Rutherford, and Soddy. I think it probable that radium is an unstable element composed of atoms which undergo spontaneous transformation, and that helium is one of the products of this transformation. Nevertheless it is possible that helium is produced from gases which surround radium and never are completely removed even in vacuum.

"In either case there is an atomic transformation, but in the second case the radium does not diminish, but acts only by its energy as the determining cause in the transformation. In any event, I do not think there would be any utility in combating Lord Kelvin's opinion. There is no reason why scientific ideas should not be discussed from various points of view.

" My final conclusion is that the outcome of the variety of investigations which are encouraged by discussion every year adds to our knowledge."

In a postscript Mme. Curle adds: "Radium is a distinct chemical element in the sense attached to the word by chemists. It is unlikely that Lord Kelvin considers radium a compound analogous to other molecular combinations. The discussion probably related more to words than ideas, it being likely that all atoms are complex-formed out of the simpler elements of nature,

which are still almost unknown." M. Laur, in publishing Mme. Curie's letter, contrasts her calm, liberal phi-losophy with Lord Kelvin's positive-

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KELVIN ON RADIUM'S ORIGIN.

He Thinks Atoms of Hellum and Lead Were Forcibly Grouped Together. LONDON TIMUS-NEW YORK TIMES.

Bpecial Cable. Copyright, 1909. LONDON. Friday, Aug. 24.-Lord Kelvin further discusses radium in a letter to the editor of The Times replying to a letter by Mr. Strutt published a few days ago. In the course of his letter Lord Kelvin says:

" Mr. Strutt asks me how I exclain the existence of radium in the earth at present. My answer is, by the con-course of atoms and interatomic motions from the time when the ponderable matter of the solar system and the stars existed as separate atoms scat-tered through the ether and moving with the velocities probably much less than the present velocities of the stars through space. It seems to me fairly probable that the atoms of helium and lead, constituting the present radium, were in later times forcibly grouped together among all the crystallizations which have constituted granite from a previously liquid earth.

"I think we may agree with Douglas Rudge and others who have suggested similar views that the molecule of radium imbedded in the earth's crust under enormous pressures probably has its constituent atoms safely protected against the explosive flyings asunder by which they produce the heating effects discovered by our laboratories."

> The New Hork Eimes Published: August 24, 1906 Copyright © The New York Times

lium and lead, constituting the present radium. were in later times forcibly grouped together...'

It was a year later when Marie responded. On Aug 17, 1907, she submitted her diplomatically worded, but scathing letter, which demolished Kelvin. This was picked up by the New York Times that led with the headline:

Third Letter: MME. **CURIE THINKS RADIUM UNSTABLE**;

But a Distinct Element in the Sense Attached to it by Chemists.

DISCUSSES RAMSAY'S WORK Believes Atoms of Radium Undergo Spontaneous Transformation. One of the Products Being Helium.

In her letter she said: "I think it probable that radium is an unstable element composed of atoms which undergo spontaneous transformation, and that helium is one of the products of this transformation. Nevertheless it is possible that helium is produced from gases which surround radium and never are completely removed even in vacuum. In either case there is an atomic transformation, but in the second case the radium does not diminish, but acts only by its energy as the determining cause in the transformation. In any event, I do not think there would be any utility in combating Lord Kelvin's opinion."

No doubt with the death of Kelvin, and with her continuing work, including the new determination of the atomic weight of radium, Henry E. Armstrong escalated his support for Lord Kelvin and attacks on Marie Curie and Pierre Curie's legacy.

Fourth Letter: Aug 10 1908: London Times and New York Times.

Headline reads: Attacks Radium School:

Prof. Armstrong Says It Has Cast Scientific Caution to the Winds

The editorial introduction states that: Henry E Armstrong vigourously supports Lord Kelvin: Still denying any evolution from one element into others ... "

The Armstrong himself attacks that the "Radium School appears to have cast caution to the winds and to have substituted pure imagination for it".

Marie continued with her work, but in 1914 World War I erupted, which stopped all of her research at The Radium Institute. She acknowledged that her work would have to wait for peacetime, but declared: "I am resolved to put to put all my strength at the service of my adopted country..." She made sure that X-ray machines

were available to help the medical doctors save the wounded, by finding and identifying the shrapnel, bullets and broken limbs.

As the German army swept toward Paris, the government moved to Bordeaux in the southwest of France. At the Government's behest, Marie took France's entire stock of radium for research (one single gram) to Bordeaux, carrying the precious metal in a heavy lead box. Once she had safely secured it, she returned to Paris to convince the government to empower her to set up France's first military radiology centers.

The "Little Curies" vehicle.

She organized money and cars from wealthy acquaintances, convinced car body shops to transform cars into vans, and begged manufacturers to do their part for the country



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Pierre and Madame Curie



Marie Mattingly Meloney, left, with Irene, Marie and Eve Curie.

by donating equipment. By late October 1914, the first of 20 mobile radiology vehicles she would equip and serve on were ready. French enlisted men dubbed these vehicles which transported X-ray machines to the wounded at the battle

gone. As Albert Einstein, a friend of Marie's for two decades said:

Marie and Einstein

"It was my good fortune to be linked with *Mme. Curie through twenty years of sublime* and unclouded friendship. I came to admire her human grandeur to an ever growing degree. Her strength, her purity of will, her austerity toward herself, her objectivity, her incorruptible judgment— all these were of a kind seldom found joined in a single individual... The greatest scientific deed of her *life—proving the existence of radioactive* elements and isolating them—owes its accomplishment not merely to bold intuition but to a devotion and tenacity in execution under the most extreme hardships imaginable, such as the history of experimental science has not often witnessed."

But, I want to leave you with Marie's marching orders that we here today must embrace. In the biography titled *Pierre Curie*, which she wrote, and it was first published in 1923, Marie Curie had this to say about our responsibility:

front, *petites Curies* [little Curies].

After the war and returning to the Radium Institute, Marie now was faced with her single gram of radium for research. She embarked on a mission to get some more. In May of 1920 Marie gave an interview 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. Marie Curie

to a Mrs William Brown Meloney, editor of an American women's magazine and emphasized the needs of her institution. She pointed out that research therapy centers in the United States together had about 50 times as much radium as the single gram she—the scientist who had discovered the element—had in her laboratory.

Marie, Mrs Meloney, Irene, Marie's daughter

Meloney organized a "Marie Curie Radium Campaign," led by a committee of wealthy American women and distinguished American scientists, with contributions to the campaign coming from many everyday women inspired by Marie's work.

The high point of Curie's 1921 tour of the United States was the White House presentation by President Warren G. Harding. Thanks to the Marie Curie Radium Campaign, she returned to Paris with ores, costly apparatus, and cash for her institute, in addition to an extra gram of radium.

In 1920 Marie and a number of her colleagues created the Curie Foundation, whose mission was to provide both the scientific and the medical divisions of the Radium Institute with adequate resources. Over the next two decades the Curie Foundation became a major international force in the treatment of cancer.

Marie's work continued with her daughter Irene, who married Jean Frederic Joliot, an assistant to Marie at the Radium Institute. They carried out considerable research on the structure of the atom, where they particularly worked on the projection of nuclei, which was an essential step in the discovery of the neutron.

But, at dawn on July $4^{\rm th}$, 1934, as the sun rose in a clear sky, Marie passed away. A treasure and a gift to mankind was

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 lessons its suffering." She then quoted Louis Pasteur, writing: "I invoke, in closing, the admirable

"I invoke, in closing, the admirable pleading of Pasteur:

"...Our society, in which reigns an eager

" 'If the conquests useful for humanity touch your heart, if you are overwhelmed before the astonishing results of electric telegraphy, of the daguerreotype, of anesthesia, and of other wonderful discoveries, if you are jealous of the part your country may claim in the spreading of these marvelous things, take an interest, I beg of you, in those sacred places to which we give the expressive name of laboratories. Demand that they be multiplied and ornamented, for these are the temples of the future, of wealth, of well-being. It is in them that humanity grows, fortifies itself, and becomes better. There it may learn to read in the works of nature the story of progress and of universal harmony, even while its own creations are too often those of barbarism, fanaticism, and destruction.""

Merci beaucoup.



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