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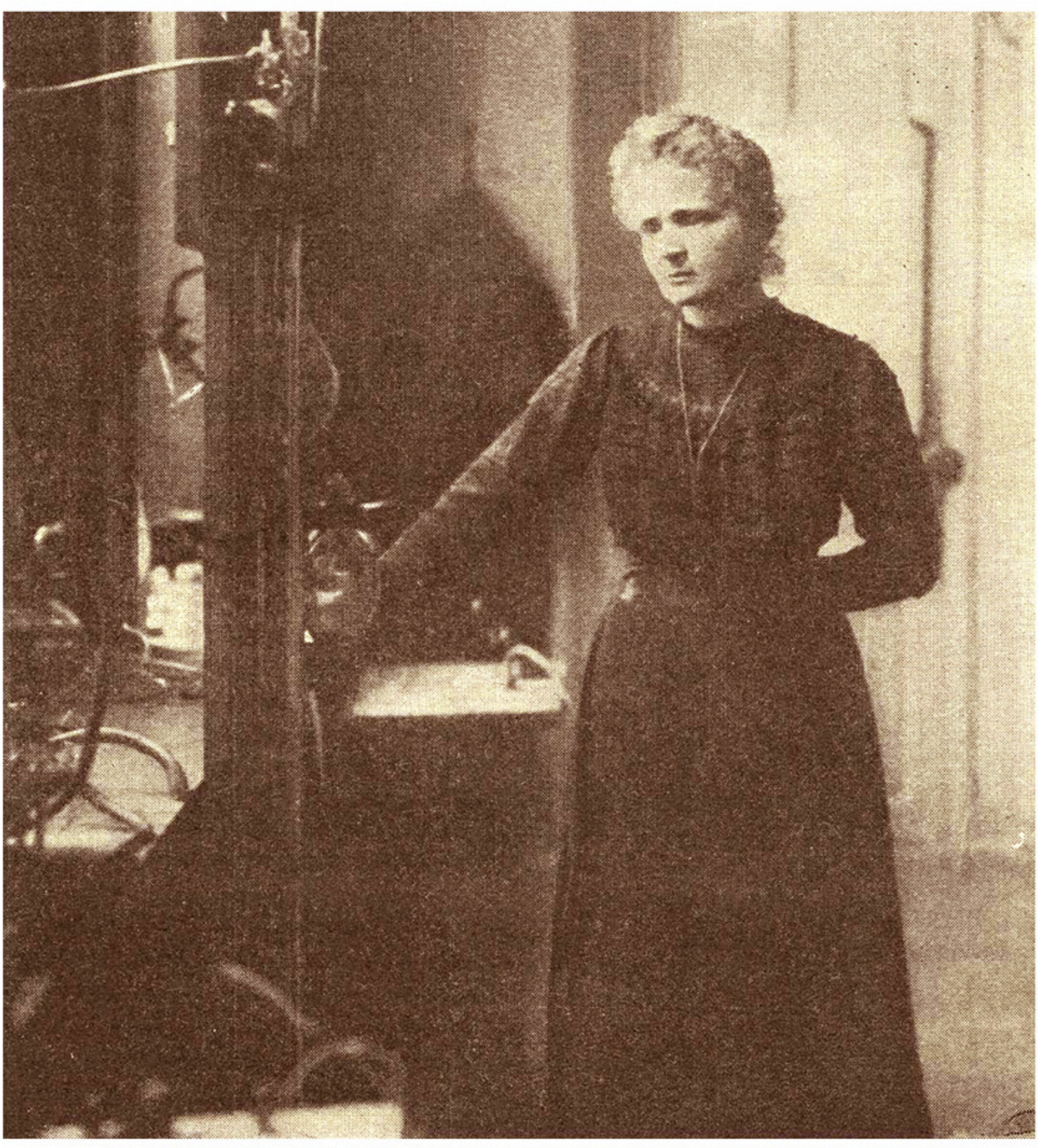
# SHE DISCOVERED RADIUM, BUT HASN'T A GRAM OF IT



AMERICA WILL SUPPLY THE MISSING GRAM.

Madame Curie, the world's most famous woman scientist, will visit this country in May. She will be presented with a gram of radium, worth $100,000, by the women of America, and the scientific societies of the nation will unite to do her honor.

THE DISCOVERER OF RADIUM, Madame Marie Curie, of the Sorbonne University, will receive the first gram of the precious stuff which she ever owned from the women of America. A committee of women and scientists is now raising $100,000 in this country in order to present the great French scientist with a small amount of the strange and valuable substance which she discovered. The presentation will be among the numerous honors, the highest in this nation's gift, which will be offered Madame Curie upon her arrival for an American visit some time in May.

This woman scientist, recognized as one of the world's greatest benefactors, "has never worked for the sake of money," writes Dr. Francis Carter Wood, director of the George Crocker Research Laboratory at Columbia University. "Now at the age of fifty-six she has nothing but the salary of a teacher at the Sorbonne University. She will not take more than that. Her only desire, she says, is for a gram of radium—for, strangely enough, the woman who gave this precious stuff to humanity has none for experimental use." Dr. Wood, now acting as chairman of the Madame Curie Radium Fund, says she will be welcomed in America "most of all because she has brought comfort to human souls." He writes of her in the New York *Herald:*

*The purest form of Radium*

The announcement that Madame Marie Curie is to visit America has caused an unexpected amount of interest throughout the entire country. Her friends here in America have received letters from many of the leading educational institutions in the country inviting Madame Curie to lecture to their professors and students. Academic honors will be bestowed upon her. Scientific societies are preparing to award her evidence of their highest esteem. No ambassador carrying all the honors that his country can bestow has been received with half as much enthusiasm as this simple and unassuming scientist.

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# She Discovered Radium

It seems strange that America, which has always been credited with the development of materialism to the *n*th degree, should desire to do honor to one who has cared nothing for the material things of this life. In France some years ago, it is true, when a referendum was taken throughout the country to decide who, in the opinion of the common people, had brought most glory to the nation it was not, strange to say, Napoleon they chose; it was not a statesman; it was not a man of affairs; it was a simple scientist who had worked in his laboratory for the love of work and without the expectation of any material reward. Pasteur was his name. He had conferred upon his country more fame than is given to most of the great ones of this earth.

Madame Curie, continues Dr. Wood, was born in Poland, educated in Paris in the famous institutions which have been in existence there for more than five times the life of the American nation and married to a French physicist, then utterly unknown to fame except to a select coterie of specialists. Suddenly this woman became world famous. He tells the story:

*Madame Marie Curie*

After the discovery of *x*-rays by Professor Roentgen several French scientists attempted to see whether *x*-rays were given off by a great variety of chemicals. By a strange accident one of the chemicals first selected was an old specimen of a salt of uranium which had stood on the laboratory shelves in the Sorbonne for many years. It was found that this salt would give a picture upon a photographic plate, even through a sheet of black paper or a piece of thin wood. The source of this uranium salt was traced to a pitchblende mine in Austria, the property of the Austrian Government. Some of the original pitchblende ore was obtained and found also to be capable of acting on a photographic plate just as the *x*-rays did. Madame Curie was well known as a competent chemist and her husband as a man of great scientific ability. To them Professor Becquerel, who had made these experiments, turned for assistance. They first found that other substances—for instance, thorium—would do the same thing as uranium would.

As the uranium ore was very expensive, the Curies could not afford to buy any of it, nor was the Sorbonne any more wealthy than the usual educational institution. The Austrian Government, however, kindly presented to Madame Curie a ton or so of the residues left after the uranium was removed, for while uranium has a moderate commercial value, chiefly in coloring glass and in certain processes of chemical analyses, the residues were of little value. Madame Curie summoned to her assistance a number of chemists, and they analyzed this ton of ore residue with most minute care and patience. It was found, as one metal after another was gradually separated from this extremely complex mixture, that certain groups—for example, barium and bismuth—showed marked photographic and other effects which ordinary barium and bismuth did not show.

To the trained mind of Madame Curie this was evidence that mixed with these substances and closely resembling them chemically there must be elements hitherto unknown, which have powers of darkening photographic plates and discharging electrified bodies. Dr. Wood continues:

After months of careful labor a few crystals of purified substance were ob ained, the whole amounting to not much more than could be held on the point of a knife, and these were the new elements in question. One of these elements Madame Curie named polonium in honor of her native country, and the other, discovered later, was named radium. Polonium has since been found to be a product of the destruction of radium.

It is difficult for any one not acquainted with the exploring habit of the scientific mind to realize the amount of labor which went on in the dingy little laboratory, not much more than a cellar, where Madame Curie worked. It is possible perhaps to understand why Peary struggled through frost and snow to the north pole. It is easier to know what propels the miner to the gold-field or the prospector to the diamond-mine; the motive of the business man is simpler still. But what is it that keeps a frail woman working day after day, night after night, month after month, and year after year in quest of something to her of no commercial value, of which she possesses at the present time not a fragment, but which has brought untold benefit to the human race at large?

# She Discovered Radium

Madame Curie did not patent her discovery; she never tried to obtain a fee for information rendered; she never concealed any of her methods; everything was open and aboveboard, so that any one could repeat all the work she had done as soon as her papers were published. She and her husband even sacrificed their small savings in order to obtain the necessary chemicals and glassware for the further pursuit of the work. Everything she had she gave to it, and she still sits in her laboratory in the Sorbonne with no source of income except the salary which the Government pays her, with no interests except the pursuit of science and the care of her two children. Pierre Curie long since ceased to aid her in her scientific work, for, dreamer as he was, he was killed by a taxicab while absent-mindedly crossing one of the crowded streets of Paris.

After all her years of work she does not possess any radium of her own, for that which she separated has long been consumed in the study of its properties. The French Government allows her to use some of its own, but this must be carefully conserved and can not be risked in experiments.

The only desire she has exprest to her friends is that she may have some radium of her own. A committee of women and scientists has been formed to raise a sufficient fund to present her upon arrival in America with one gram of this precious substance. The committee has announced that it will welcome contributions of any size from the women of America and that the Equitable Trust Company, of 37 Wall Street, New York, has been empowered to receive donations for the Madame Curie Radium Fund.

Not only have I gladly accepted membership on this committee to provide this self-sacrificing woman and great scientist with the only thing which she wishes in the world, but every one whom I have approached to assist us in this matter has responded with equal enthusiasm. Only yesterday a clinic patient of mine, suffering from cancer, begged that she might be permitted to contribute $1, all that she could afford, in order to help the cause. Her name will rank high on the list which will be given to Madame Curie when the radium is presented, as will those of the women of greater means, several of whom are giving $1,000 apiece and one $10,000.

Only those who have worked in a laboratory can know the fascination of discovery and can appreciate the motives which led these two people to devote their lives to the separation of radium and its allied compounds and the study of their nature. The children of one's brain are far more immortal than the children of the body. They, indeed, can never be taken from one. No one can injure them. No one can buy them; they remain always a monument erected by the brain to its capacity to reason. Even in its busy and multifarious life the world in a queer, dumb fashion appreciates occasionally one of these great research workers and attempts, in a clumsy way perhaps, to express its approval and to offer some reward. Usually the world is quite astonished and even pained to find that true science is its own reward and that nothing it can do, either by applause or by criticism, can in the least influence one of the great geniuses. The reason is very simple; the great genius is creative, and those who create have very little interest in material things.

And so Madame Curie, after a long life of arduous labor, is to take a few weeks' vacation and come to a country she has long wished to visit. She will find here, says Dr. Wood, many friends and pupils, for her laboratory has long been a place to which ambitious students flock. She wishes to see some of the institutions in which her original discoveries were carried on and amplified, for the discovery of radium has led to the finding of many other curious new elements, some of which are as fugitive as the gnats of a summer evening, mere ghosts of matter whose life is a few seconds, while others are so stable that in 200,000 years no loss in weight will be appreciated by the finest balance of that far-distant period. Yet by the delicate electrical tests devised by Madame Curie we know these elements are slowly changing. One of them, adds the writer—

Lasts only five-hundredths of a second before it explodes into a descendant which lasts a little longer, and finally all of them stop when they get to lead, for, what most people do not know, there are two kinds of lead in the world. One kind of lead, of which there is very little, comes from radium and another kind of lead comes from the plumber. Of the radium lead there is scarcely a pound in existence, but its cost is so high that even the plumber's lead seems cheap.

It is hoped that Madame Curie when she reaches America will tell of some of the extraordinary discoveries which she has made; how radium is the realization of a part of the old alchemist's desire to be able to change one metal into another. It is true that the alchemist was interested only in changing ordinary metals into gold, and it is also true that Madame Curie, the descendant of these alchemists, is not able to change radium into anything else, for it changes itself, and neither the hottest furnace nor the coldest liquid air makes any difference in the way or speed with which it changes.

It goes on quietly exploding and sending off big bombshells of a gas known as helium, which, as every one now knows, comes out of some gas-wells in Kansas in large amounts and was to be used for filling dirigibles if the war had lasted longer. Most people do not know, however, that helium was first discovered in the sun by the spectroscope and for many years remained undetected on earth.

But when the radium atom blows up it sends off great bombshells of helium, at the rate of 10,000 miles a second, and these go shooting through the air until they strike an air molecule and are checked.

The great force which they possess has been used in a very

extraordinary way of late by one of Madame Curie's pupils, Sir Ernest Rutherford, to show that by bombing ordinary nitrogen gas—atoms of the same kind of nitrogen that we breathe—an atom of hydrogen can be knocked out of it. Thus again is the alchemist's dream fulfilled, for, as he probably guessed, all of the substances that we know are composed of a few elements of which hydrogen is one, and possibly the only one. When radium explodes it sends off not only the big bombs but a lot of little, very high-velocity shells, some of which go nearly as fast as light—and light travels faster than anything else can ever travel. As these little electrons shoot madly out through space they give such a kick to the atom that is left that it wabbles frantically, and, lo! a beam of *x*-ray is produced. The *x*-rays from radium we call gamma rays.

How do we know all these things? Because we can see many of them—that is, the eye of the camera can see them, and after all it seemed ridiculously simple when it was really thought out by a bright Englishman. He put the radium in a glass bottle filled with damp air, and then by changing the pressure a little made a fog, and the fog settled on these minute shooting stars, just as it settles on the spider-webs on damp autumn mornings. Then as these fog-laden particles shot through space at the rate of thousands of miles a second he photographed them by flash-light—not the ordinary flash-light, which would never have stopt them, but the quickest flashlight which we know (that is, an electric spark, which is only 1-300,000th of a second). And so we have actually made visible particles smaller than what we used to think was the smallest thing known, and that is the atom. These little particles weigh but 1-1,800th as much as the atom weighs.

Now, all this may seem very uninteresting and theoretical, but every one to-day knows that radium is used to treat cancer, and the reason why we use radium to treat cancer is due to an unfortunate accident which occurred to Prof. Henri Becquerel. After he had carried in his pocket a tube containing a little radium he had for a few weeks a bad burn on his stomach. As the older physicians were used to burning out cancers with caustics, the idea occurred to them that radium was perhaps a magic caustic, and so it has proved to be, for when suitably used radium benefits and, in a few instances, cures tumors.

A diamond as it comes from the mine is an uninteresting, dull lump that looks like dirty glass, and no one would suspect its beauty as it finally leaves the hand of the cutter. So, too, radium is disappointing. It looks like a little tooth-powder enclosed in a glass tube. Ten thousand dollars' worth can be put into such a tube about the size of a coarse pencil lead and not more than an inch in length. The glass tube is very thin and is enclosed in a silver one, so as to prevent breakage in handling.

Radium does not do what we all hoped at one time it would do: that is, cure all tumors, but it has brought freedom from pain and comfort and prolongation of life to many thousand suffering human beings.

The movement that is under way to raise funds for purchasing a gram of radium to be presented to Madame Curie when she comes to this country in May is a bit of sentiment not without its practical lesson, says *The Engineering and Mining Journal* (New York):

So rare and valuable is this substance, whose mysteries are but half explored, that its very discoverer, when asked as to what she most desired, said that she wanted a gram of radium more than anything else in the world. The great value of radium and the minute quantities in which it is dealt are evidence of its scarcity. The visible supply of both the element and the ores that yield it is small, and at the present rate of consumption a scant half dozen years may see the known deposits practically exhausted. Blind optimism can not discover new ones. Doubtless Madame Curie's great desire has been made more keen by the prodigal way in which she sees radium wasted in the manufacture of luminous dials and similar articles. It is safe to say that the greater part of the current production of the substance is being so consumed. Radium thus used is, of course, a total loss. It can not be readily salvaged as can old gold and silver. A gram given to Madame Curie will be a gram saved, and saved it should be until everything is known about it, or, at least, until its promise as a cure for cancer fades.