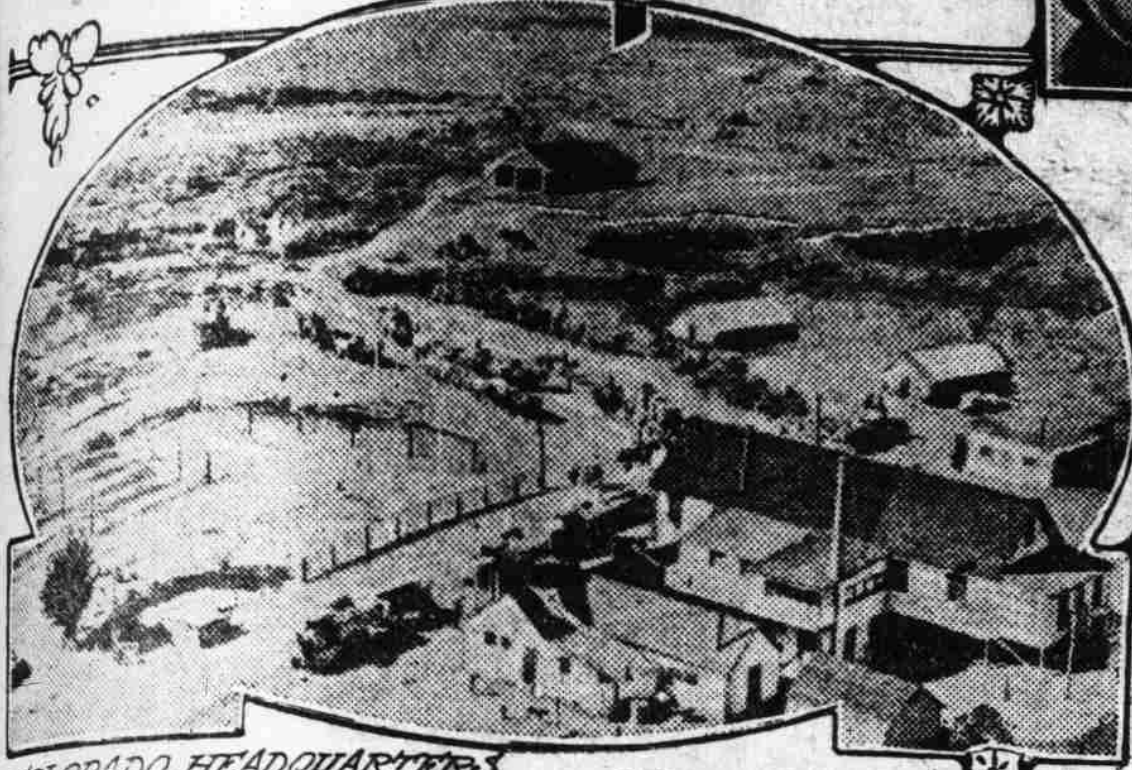


# RADIUM: Mine To Hospital



COLORADO HEAD QUARTERS

By JOHN DICKINSON SHERMAN.

CONCERNING Mme. Marie Curie and her discovery of radium, her recent visit to the United States and the presentation to her by American women of a gram of radium in recognition of her services to science and humanity the reading public is sufficiently informed. Everybody knows that she was made much of by our dignitaries; that ten degrees were conferred upon her by our universities; that President Harding himself made the presentation to her in the White House with appropriate words in the presence of a brilliant gathering of notables, and that a tired and happy woman finally sallied away with her precious gram of radium stored in a mahogany case lined with steel and lead. She said she was going to take a real rest and that she hoped in September to go back to her work in the Curie institute in Paris—now that she again has radium to work with. The institute divides its work along two main lines. One has to do with the study of radium and radioactive substances purely from the viewpoint of the physicist; the other deals with their application to the treatment of human ailments. She will also carry on an extensive investigation of mesothorium, another radioactive substance—enough of this was presented to her to bring the value of the combined gift to \$153,000.

But where this American radium came from and how it was produced is another story, which may profitably be told in this connection. It is especially interesting, inasmuch as the total world's supply of radium is estimated at only 140 grams (a gram is one twenty-eighth of an ounce). The illustration by comparison shows how small is this amount. The lower section represents that made by the principal American radium refinery, the dark section that made by other American refineries and the upper layer that produced abroad. So, though radium was not produced in the United States till 1913, this country now has made about five times as much as the rest of the world.

While Mme. Curie, by discovering radium, introduced a new conception into the fundamental problems of existence, she actually produced very little radium, since she was denied the ores with which to work. Moreover, she gave it all away to the medical profession of Europe. A very small portion found its way to New York. In 1911 the late Joseph M. Flannery of Pittsburgh, who had made a success with vanadium as an alloy for steel, devoted his attention to the production of radium. The ores of other countries being out of the question, he turned to the carnotite deposits of southwestern Colorado. Prior to the World War this carnotite ore had been shipped to French and German producers of radium.

The mining and handling of carnotite ore in southwestern Colorado is attended with difficulties. The region is desolate and practically uninhabited. Water is scarce. Flannery had his troubles. He had to train new men. He finally established headquarters at the only spring of clear water within 100 miles; here the Standard Chemical company maintains all the offices for its mining work, transportation and supplies. Eighteen miles away the company built the largest radium concentration mill in the world, through which has passed the ore from which has been refined more than half the world's supply of radium. Burros carry the ores from the mines to the mill, and water and supplies to the miners.

Mme. Curie worked on European ores which contained about one gram of radium to every five or six tons. In the Colorado ores there is about

WORLD'S SUPPLY

one gram to every 500 tons. Moreover, the carnotite miner is a pocket hunter. Sometimes the ore appears on the surface and along rim rocks; then extraction is easy. More frequently the ore is found under a heavy overload of other material; then regular mining tunnels are run and dynamite is used to break the rock for transportation to the surface. The pockets vary widely; some contain only a few pounds, while exceptional pockets have contained 1,800 tons.

First, of course, the pocket must be found. Prospecting is done by drilling in likely spots with jack hammers and with diamond drills. Where the overlay is not more than 25 feet deep the jack hammer, operated by portable gasoline compressors and compressed air, is the cheapest method of working. Under other conditions the diamond drill is used.

Hamilton Foley writes for the Pan American Union an interesting account of the operations of the company and of the production of the radium presented to Mme. Curie; the pictures used herewith are among the illustrations. He says in one place:

"Let us follow the various operations from the extraction of the ore to the final recovery of the radium. At the concentration mill in the wilds of Colorado 500 tons of ore are reduced to about 125 tons. In a powdered form this quantity is shipped in 100-pound sacks, by wagon and, where possible, by motor trucks, the 65 miles to Placerville, Colo. Here a narrow-gauge railroad takes it to the transcontinental railroad at Salida, Colo. From Salida it travels the 2,300 miles to Canonsburg, Pa., just outside of Pittsburgh, where the company maintains its concentration plant, No. 2.

"It should be noted that at the mill in Colorado, and in the operations pertaining to it, some 300 men are necessary to carry through all the detailed work. Also, that when the ore is taken up by the Colorado mill, there is only 1 part radium for every 400,000,000 parts of the ore; but when the ore reaches the mill at Canonsburg the proportion is 1 part of radium to 100,000,000 parts of the ore.

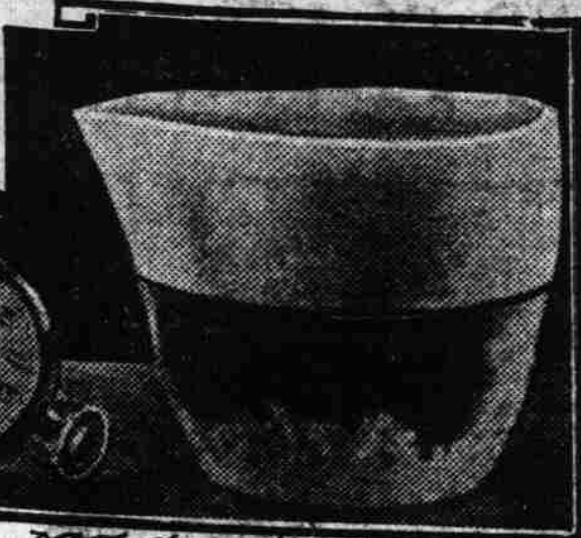
"The task of the Canonsburg men is to reduce this mass of ore to less than a quarter of a ton, and in such a way that whatever radium may have been in the greater mass will be found in the small residue. This is done with regularity and precision, notwithstanding that in the elimination of the 100,000,000 parts of undesirable material the Canonsburg plant has to use 10,000 tons of distilled water, 1,000 tons of coal, and 500 tons of chemicals. It should be noted in this connection that whatever small quantity of vanadium and uranium there may be in this material is saved while this final reduction is being made.

"The actual recovery of whatever radium there may be in the tons of material handled at these two great concentration plants is made elsewhere. When the 125 tons of material that reached Canonsburg from the mill in the West have been reduced to less than a quarter of a ton, this residue is sent to the radium research laboratories of the company in the form of radium barium chloride. By suc-

cessive fractional crystallizations of the radium chloride and, at a later stage, of the bromide, most of the radium is obtained in a salt containing over 95 per cent of pure radium bromide. By still further chemical treatment the bromide is converted into the sulphate or the chloride, and in the therapeutic use of radium these two salts find the largest use."

Mme. Curie, several years ago by general request, fixed an international radium standard. This is deposited in Paris and the leading cities of the world have replicas of it. So now radium preparations are measured by comparing the electrical energy carried by their gamma rays with that of the international standard. While radium has still many mysteries, it may be said for the benefit of the general public that its energy appears to be given off in three rays, which are known as the Alpha, Beta and Gamma rays. It is stated that the Alpha and Beta rays are electrical and that the Gamma ray is rather a vibration than a ray. The Alpha ray is believed to comprise 85 per cent of radium's activity; it travels with about the speed of light and has no penetrative power. The Beta ray is about 10 per cent of the activity, travels with about 1-15 the speed of light and can penetrate about an inch and one-fifth of lead. The Gamma ray can penetrate more than three inches of lead; when it strikes a hard substance it breaks up into two rays corresponding to the Alpha and Beta rays.

It is the Gamma ray that is used in bloodless surgery. The Alpha ray does not burn. The Beta ray is kept from the patient by a screen that absorbs it. The Gamma ray seems to have the peculiar quality of picking out useless or harmful tissues for its first attack; it will harm useful tissues only after harmful tissues have been burnt away or dissolved. Radium is handled in glass tubes incased in lead containers. Those who handle it constantly usually get pretty badly burned sooner or later. Flesh burned by radium cannot be healed; it simply disappears and is gone. One of Mme. Curie's hands has been affected and her general health has been undermined by intensive wartime work with radium.



MME. CURIE'S RADIUM



TRANSPORTING ORE



RADIUM AND CONTAINER

## SOMETHING TO THINK ABOUT

By F. A. Walker

### WHAT A MAN READS.

SOMEONE has said that Charles E. Hughes, the secretary of state, did not read novels or verse while he was at the university, and that he was so absorbed in science as to miss all the poetry and romance of college life. To disprove this statement the librarian of the John Hay library at the recent commencement of Brown university showed in a glass case the very books that Mr. Hughes had taken out. They included the regular novelists that everybody is supposed to read, and such poets as Tennyson and Longfellow.

Variety in reading is just as necessary as variety in food.

Some good people did not understand this when they objected to novels on principle as frivolous and a waste of time.

A celebrated man of science of the latter part of the Nineteenth century used to find himself losing interest in his work every now and then. When this took place he would shut himself up with a great supply of dime novels and read nothing else for a week. Then he would go back to his laboratory as fresh as ever.

On the other hand, a certain French novelist, whenever he found himself in need of a mental rest used to read the Criminal Code.

Charles Darwin as he grew older lost all interest in poetry, but found recreation in novels with good lively plots that held his attention.

One reason why detective stories are so popular with all sorts of readers is because they appeal to the love of mystery which is almost universal.

It has been said of Poe that he would have made a good detective because of his gift for fitting together a criminal mystery. The idea was that he would have been able to take criminal puzzles to pieces as well as

put them together. One side of his work kept him interested in the other.

When a boy is at school or college his reading is divided into two sorts—"voluntary" and "involuntary." He reads for pleasure and he reads for business.

As nobody's education is ever finished the same division should mark later life.

Mrs. Asquith in her celebrated "Autobiography" tells how she belonged to a sort of society the members of which agreed to do an hour's serious reading every day.

Doctor Johnson said that if a man read any subject for an hour daily he could not help becoming "learned." His own great difficulty was that he was unsystematic.

By reading certain things for recreation and at the same time following a course laid down in advance, a person gets the additional benefit of discipline.

In the Eighteenth century they thought nothing of reading through Homer, Virgil and Shakespeare once a year. No wonder they were able to think in those days.

(Copyright.)

### THE ROMANCE OF WORDS

JACK.

WHILE this name is, of course, the diminutive of John—or, rather, the Anglicised form of the French Jacques—it appears in English in a number of ways which apparently have no connection with the name. Among these may be mentioned boot-jack, jack-knife, lumber-jack, black-jack, Union-jack and jack-tar.

The reason for this usage is because the proper name or nickname, "Jack," has for many years past been applied in England to servants or laborers as a class. Jack is a handy and easy name for a waiter or a caddy, or a groom, much as many Americans apply the name George to any negro porter. For this reason, many appliances which are subject to rough usage or which perform the tasks of a laborer are known by the prefix "jack," with a noun which designates the use to which they are put. The expression "Jack of all trades" is another exemplification of the same usage, while the substitution of the name "Jack" for the "knave" in a pack of cards is an indication of the hard usage which this gentleman undergoes, at the hands of the queen, king and ace.

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## SCHOOL DAYS



My goodness, but the mosquitoes are bad today!

Ha! A good sleep, Kirby?

The Sun Glass - Copyright

### THE GIRL ON THE JOB

How to Succeed—How to Get Ahead—How to Make Good

By JESSIE ROBERTS

#### TRAINING SALESWOMEN

IT WAS a thriving little store in a small village in New England. I had some chintz to get, and she was a real help in finding something, though the stock was necessarily limited. But she had taste, and a sense of color, and she was interested.

I found that she had graduated that year from high school, and gone into the store to earn money during the summer, and that she meant to go to the city and try for the position of saleswoman in one of the large department stores. She asked me what I thought of her chances.

I advised her to go to the highest-class store of the kind she wished to work for.

"Take a lot of pains with your appearance. Remember that you are not only applying for the job that is now open to you, when you are ignorant and untrained, but for the job in the future when you have got your training and when you know your possibilities."

There are splendid opportunities for saleswomen nowadays. It is one of the big professions now open to women. But it is a difficult one, with much competition and an almost endless amount of training. It requires hard work and natural aptitude. I think the girl I met that day is going to succeed. She had the right idea and the love for it, too. But don't think, when you hear of the big salaries and wonderful opportunities in that profession, that you can get these without deserving them.

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## MOTHER'S COOK BOOK by Nellie Maxwell

This is a difficult world indeed And people are hard to suit. The man that plays the violin Is a bore to the man with a flute.

### FAVORITE DISHES.

WHEN it comes to cooking for the family, the housemother does indeed have a hard time to suit all members, if they are not normal in their appetites.

#### Honey Mousse.

Heat one cupful of well-flavored honey. Beat four eggs slightly and pour the hot honey over them. Cook until smooth and thick; when cooked add a pint of cream, whipped. Put the mixture into a mold, pack in salt and ice and let stand three or four hours.

#### Carrots a la Poulette.

Wash and scrape eight medium-sized carrots. Cut them into thin slices, cook in a small amount of salted boiling water with one thinly sliced onion; season with pepper. When tender add two tablespoonfuls of butter mixed with flour, stirring constantly, and just before serving stir in the well-beaten yolks of two eggs. Serve as soon as the eggs are cooked.

#### Tomatoes With Ham.

Cut medium-sized tomatoes in halves, dip in seasoned flour and fry brown on both sides. Fry in another trying pan as many small round slices of ham as there are halves of tomatoes. Broil the ham until crisp. Place a slice of ham on the tomato and pour over the ham gravy. Serve sprinkled with chopped parsley.

#### Apple and Banana Salad.

Scop out apple balls, cover with lemon juice, and prepare banana balls, using a small French potato cutter. Heap on head lettuce, sprinkle with paprika and serve with a highly seasoned French dressing or a rich mayonnaise.

#### String Beans With Beurre Noir.

Prepare a quart of beans cut into inch pieces. Cook in boiling salted water; drain and place on a hot dish. Pour over the following sauce: Melt one-fourth of a cupful of butter until a delicate brown, add four tablespoonfuls of vinegar; when hot pour over the beans and serve at once. Salt pork cut in small dice and fried until brown may be used in place of butter for this dish. Pour the fat, with the bits of browned pork over the beans.

#### Delmonico Peach Pudding.

Turn a pint can of peaches into a pudding dish. Scald two cupfuls of milk in a double boiler. Mix two and one-half tablespoonfuls of cornstarch with three tablespoonfuls of sugar and one-half teaspoonful of salt. Stir into the hot milk; cook, stirring until the mixture thickens, then cover and cook for fifteen minutes. Beat the yolks of two eggs, add a tablespoonful of sugar and stir into the hot mixture. When the egg is set pour over the peaches. Beat the whites of the eggs very light, add four tablespoonfuls of sugar, spread over the pudding. Dredge with a teaspoonful of sugar and bake in a moderate oven to cook the meringue. Serve hot or cold.

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## LYRICS OF LIFE

By DOUGLAS MALLOCH

### THE EASY CURE.

YOU had a little hurt today, I know it by your face, A hurt you hoped to hide away, And yet it left a trace. You tried to wear the usual smile, Yet futilely you tried— That little trouble all the while Was hurting you inside.

My, my, I wish that money, too, Would earn the interest That ordinary troubles do. We carry in our breast! Inside ourselves deposited They grow and grow and grow, But not in gold—a load of lead Is all we ever know.

Now, I've a simple little plan I've used with little ills, I'm glad to tell to any man Who's blue around the gills: Just ask yourself: "This little ache, This trouble, anyhow, Just how much difference will it make A year or so from now?"

What was it that you used to want?— What was it made you sore?— Your woe a year ago you can't Remember any more! The thought of troubles you forgot Will cut the new in half; And then, I bet, as like as not You will not smile—but laugh!

(Copyright.)

### THE CHEERFUL CHERUB

So many things are queer I think Upon this funny earth When I consider high-heeled shoes I just could shriek with mirth



## POISONOUS FLOWERS

The poppy is a common flower whose odor has evil properties. Doubtless this is due to the amount of opium which the blossom contains. Numbers of individuals, especially young ladies of highly strung temperament, complain of a drowsy sensation after walking through a field of these flowers. Violent headaches follow. In Asia Minor, where poppies are grown in vast quantities, tourists frequently are in-

capacitated for many hours after inspecting a poppy plantation. Deaths have been traced to this cause. The dainty heroine who idly plucks pieces of the petals of a flower must be aware when blossoms she chooses for the purpose. Lilies, begonias, rhododendrons and peonies are likely to set up fevers.

### Avoid Staleness.

You can avoid staleness if you have will power enough to assert yourself. Like the fabled hero of the ancients

who grew stronger every time an adversary threw him to the ground you can "come back" if you go to mother earth. Get out into the open. Go to the streams where the fishes play. Climb the hills where you will be compelled to pant good air into the lower lungs. Chase the wild things of the forest and then try to outdo the tunderers with unrestrained halloes and see what nature will do for you. There's something in the careless abandon of nature that puts fitness into the whole man.—Grit.