Marie Curie

THE GOOD AND THE BEAUTIFUL LIBRARY

• Robin McKown •

Marie Curie

By *Robin McKown*

Cover illustration by Ollie Cuthbertson
Cover design by Robin Fight
First published in 1959

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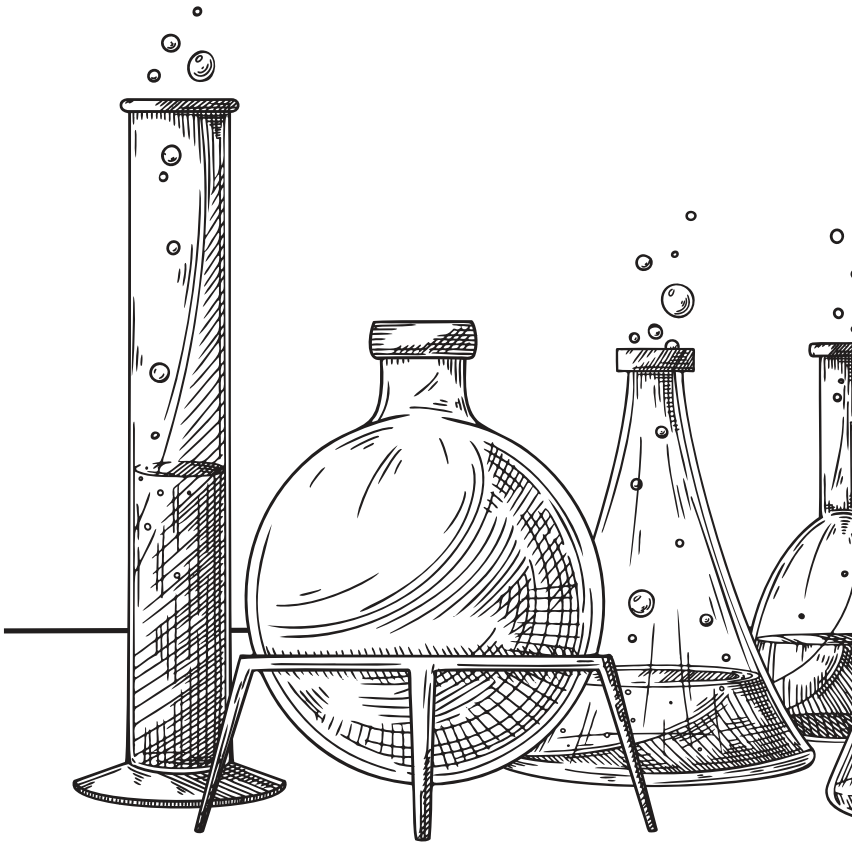

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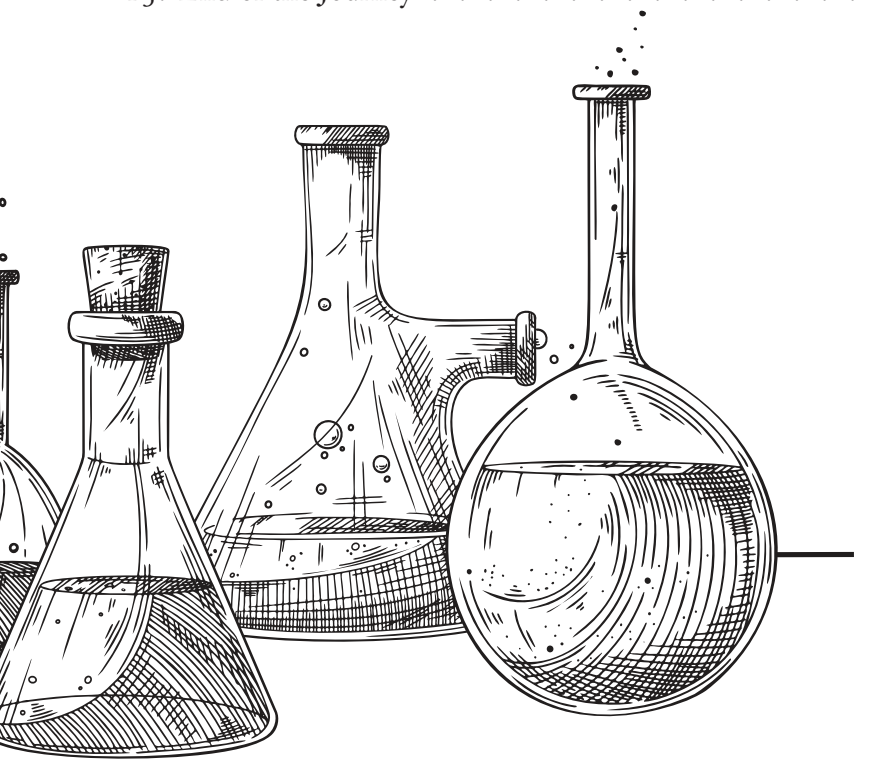

CHAPTER ONE

Baby of the Family

Back in 1923, the American publisher of Marie Curie's biography of her husband, *Pierre Curie*, requested that she write a short autobiography to add to the American edition of this work. Madame Curie protested that this could be of little interest:

> It will not be much of a book. It is such an uneventful, simple little story. I was born in Warsaw of a family of teachers. I married Pierre Curie and had two children. I have done my work in France.

Yet even during her lifetime, Marie Curie was honored and acclaimed. Twice she was awarded the Nobel Prize, and a mere listing of her scientific prizes, awards, medals, and honorary titles fills more than four pages of fine print. The biographer Emil Ludwig included her in his list of the ten greatest women in history, her portrait was placed in a temple in China as one of the "benefactors of humanity," and Albert Einstein paid her as great a compliment as any woman has ever received when he wrote at the time of her death:

> It was my good fortune to be linked with Madame

> 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.

With her husband, Marie Curie was the discoverer of radium. Her work did not begin or end there. Einstein summed up the greatest scientific deed of her life as "proving the existence of radioactive elements and isolating them." As a result of her work, the study of physics and chemistry was revolutionized. Matter could no longer be considered inert and motionless. An atom was not a tiny solid but a galaxy with a nucleus as a sun, around which electrons, like planets, spun in orbit. Matter and energy were, in their ultimate state, one and the same thing. Inconceivable potentialities for power lurked in particles so small no microscope could make them visible. The discovery of radium and of radioactive substances, then, marked the opening of a new era—the Atomic Age.

The story of Marie Curie has the beauty of a legend. It is about a great love and a great work, and about a woman who had the qualities of a saint and yet very human emotions. It is a romantic story, sad in parts, but with the joy of achievement triumphing over sorrow.

She was the youngest of them all, a chubby little girl with short pale gold curls, big gray eyes, a stubborn mouth, and an amazingly high white forehead. Her name was Marya, but the family called her Manya, or sometimes Manyuuska, meaning "little Manya." She was born on November 7, 1867, in Warsaw, Poland.

Manya's father and mother were both teachers. The father, Vladislav Sklodovska, taught mathematics and physics at a Warsaw high school. He had been to the University of Petrograd in Russia and was very well educated. The mother taught at an

exclusive private school for girls until ill health forced her to resign. She had a beautiful singing voice, and it was her hope that all her children would study music. Like many of Poland's intellectuals in this period, Manya's parents both came from families of well-to-do farmers.

There were five children in all. When Manya was four, the oldest, Zosia, was eleven; Joseph, the only boy, was nine. Bronya was three years older than Manya, and Hela was almost six. They were all blond, handsome children and bright in their studies.

Even so, Manya had startled them one day with her precocity. Bronya had been reading aloud her class lesson, stumbling through it like any youngster of seven. The baby, Manya, seized the textbook and read the passage herself, clearly and correctly. How she had learned to do this was a mystery. The parents tried to keep her away from books. It was better for a small girl to play out in the garden than to strain her eyes reading. But when visitors called, they couldn't resist asking her to recite. Manya, who was shy, would want to go and hide.

Professor Sklodovska had no laboratory at his school. In a glass case in his study at home were his instruments—glass tubes, small scales, an electroscope. Manya, wandering around his room, stopped in front of the case, fascinated.

"What are those, Papa?"

"My scientific apparatus," he explained.

Manya never grew tired staring at his "scientific apparatus."

Sometimes she heard her father speak in a low voice of Mr. Ivanov, the Russian director of the school where he taught. Even when she was very young, she understood that Mr. Ivanov belonged to the "enemy," that he was employed by the Russian government to spy on the teachers and the students alike.

Poland at this time was not a free country. Many years before, in 1807 after Napoleon was defeated, three foreign powers—Austria, Prussia, and Russia—had divided Poland between them. Warsaw, where Manya lived, was part of Russian Poland.

Twice the Polish people had organized revolts against the Russians, once in 1831 and again in 1863, four years before Manya was born. Both times the revolts had been put down, and the leaders had been hanged or sentenced to exile. But the Russians were made to realize they could not kill the people's desire for freedom by such cruel measures alone.

They ruled that only Russian would be spoken in Polish schools and churches. They sent in Russian policemen, officials, and professors. They censored newspapers and books to see that nothing was printed not in favor of Russian rule. In this way they hoped to make Russians of these stubborn Poles.

The Polish patriots decided that since they could not yet win by force of arms, they would wage a battle of wits. Secret meetings were held, and groups of intellectuals were organized, including professors and priests. They pretended to obey the Russian regulations so they could keep their positions, but secretly they taught Polish history and the Polish language to their students.

Professor Sklodovska hated Russian interference in his classes, but usually he kept his tongue in the presence of the director. Once, when Mr. Ivanov criticized a pupil for mistakes in Russian grammar, he forgot himself.

"Everyone makes mistakes sometimes, Mr. Ivanov," he protested. "Even you make mistakes in Russian fairly often."

The director was furious. Shortly afterward, Professor Sklodovska was notified that his salary was cut and that he could no longer occupy his pleasant apartment in the school building.

This was the beginning of a series of misfortunes for the Sklodovska family. The professor invested his life savings in a project of his brother-in-law's to finance a steam mill. The project failed, and the money was lost. He could never forgive himself for the harm he'd done his family by this bad investment.

To add to their now small income, they took in the professor's students as lodgers in their new apartment. These sometimes

rowdy boys slept in the bedrooms, while Manya and her sisters used couches in the dining room, rising at dawn to straighten up the place before breakfast was served. The peaceful family life was a thing of the past.

Then Bronya and Zosia fell sick with typhus. Bronya recovered, but Zosia, the oldest and the merriest of them all, died of the disease in January of 1876, when Manya was eight. The blow saddened them all, and Madame Sklodovska, Manya's beautiful mother, never recovered from her grief. Her health had become increasingly poor. She had tuberculosis. Manya was nine when the family gathered around her mother's bedside for the last time. She gave to each of them words of comfort and farewell. Manya remembered her mother always for her sweet disposition, her kind heart, and her sense of duty.

Various housekeepers came to take charge of the household after that but could not substitute for a mother's care.

Manya's first school was a private one, but it too was periodically inspected by a Russian official. Many of the professor's students had difficulty mastering the Russian language, but Manya learned it with no trouble at all. When the Russian inspector, Mr. Hornberg, paid his regular visit to her school, Manya's teacher always called on her.

Manya hated it.

"Recite the Lord's Prayer," the inspector ordered her on one such occasion.

Her face white, she obeyed, speaking in a monotone the words she felt only had real meaning in the Polish tongue.

"Name the Czars who have ruled over Holy Russia since Catherine II," he demanded next.

"Catherine II, Paul I, Alexander I, Nicholas I, Alexander II . . ." she reeled off the names.

He asked more questions, and Manya answered them all to satisfy him. Finally he nodded curtly and left. He never knew that his arrival had been announced by two long rings and two

short ones from the porter's bell, which had given the girls just time to clear away their Polish books and substitute their sewing.

Afterward, the teacher called Manya up to her and kissed her on the forehead. But Manya burst into tears.

In the evenings the Sklodovska children and the boarders would gather around a long table to study their lessons. None learned more easily than Manya. It was nothing for her to memorize a long poem by reading it through once or twice. She always finished her studies first, after which she might help one of the older boys to solve a difficult problem in arithmetic.

She learned fast because she knew how to concentrate. When she was studying, she would not even hear Hela, next to her, reciting her lessons aloud. One day, for a joke, the children made a scaffold of chairs around her, one resting precariously over her head. She noticed nothing until she finished her book and got up to go to bed. As the chairs crashed around her, her sisters and the boys burst into shrieks of laughter.

Manya looked at them calmly. "That's ridiculous," she said, and left the room without another word.

She was going to high school then. Originally this school had been established for German government officials, and the discipline was in the strict German tradition. It seemed that the Poles here were considered lower than anybody, yet once, an amazing thing happened. A Russian professor presented a pupil with a volume of poems by a Polish revolutionary writer. Manya could not get over it. Was it possible that even among the Russians there was some sympathy to the cause of Polish freedom? It was a wonderful thought.

The official persecution of the Polish people continued. One day Manya and her schoolmates found a young girl named Leonie weeping bitterly. They gathered around to ask what the matter was.

It was her brother, Leonie told them between sobs. He had been part of a group who were plotting against the Russian

oppressors. Someone had denounced him, and he had been put in prison. The Russians were going to hang him the next morning at sunrise.

That night Manya, Hela, Bronya, and two other girls stayed with Leonie in her small room. There was not much any of them could say, but they offered her what comfort they could, bathing her face with cool towels from time to time and trying to force her to drink some hot tea. When dawn came, marking the moment of the brother's execution, all six knelt in prayer. At that moment it seemed to Manya that nothing was important except for Poland to be free again.

She graduated from her high school studies on June 12, 1883, a few months before her sixteenth birthday. Like Bronya and Joseph, she was given a gold medal, the highest award the school had to offer. After his graduation, Joseph had enrolled at the Faculty of Medicine in the University of Warsaw. But no women were allowed in the university. Bronya, who was so intelligent, was now staying at home, looking after the household and cooking and cleaning. Even at fifteen, Manya felt that to be unfair.

She had become thin and pale from her intensive studying. Her father decided she needed a vacation and shipped her out to some relatives in the country. She spent more than a year with different families, doing almost nothing but enjoying herself. It was the one carefree period of her life.

That year made her an ardent lover of nature. She went for hikes in the woods with other young people, picking wild strawberries and eating them with a large appetite. With her companions she gathered poppies and cornflowers and pinks and made them into gigantic wreaths. One uncle with whom she stayed had a stock farm with fifty thoroughbred horses. Manya, in borrowed breeches, learned to be an expert horsewoman.

Other relatives lived at the foot of the Carpathian Mountains. Much as she liked the open country, with the plains gently rolling

to meet the horizon, she was enchanted with her first sight of the mountain peaks. There were excursions to valleys and to high mountain lakes with picturesque names like Eye of the Sea. Mountain climbing, following narrow trails up through fragrant fir trees and green bilberry bushes spotted with tiny alpine flowers, seemed to her the most glorious sport there could be.

For the winter months, she stayed with another uncle on the Galician frontier. He was an amiable man with three daughters about Manya's age, all rosy-cheeked and full of laughter. "How beautiful you are," they cried, clustering around their city cousin on her arrival.

Manya gazed at them in astonishment. Bronya was beautiful and so was Hela, but she had never considered herself so. Without realizing it she had passed through the awkward period of her early teens and had blossomed into an exquisite young woman with fine, delicate features crowned by a halo of golden curls that never would stay in place.

Galicia was under Austrian control, which was much less severe than the Russian rule in Warsaw. Here people could speak Polish and sing Polish songs freely, without fear of being sent to prison.

Life at her uncle's was a round of parties and entertainment. "You are going on a *kulig*," her cousins informed her one day.

"What's a *kulig*?" Manya asked.

"You will see."

The *kulig* began with a glorious sleigh ride across the snow. The girls, in peasant clothes and bundled up in blankets, huddled inside the sleigh, while their young men, also masquerading in rustic dress, rode on horseback as a mounted guard. Other sleighs of young people caught up with them, including one with four little musicians whose tunes intermingled with the rhythm of the horses' hooves on the hard snow.

They stopped in front of a darkened house and started pounding on the door. Miraculously the lights burst on, and

they went inside to a feast at ladened tables, prepared much in advance. At a signal they all departed, including their hosts, and the *kulig*, growing like a snowball, continued to the next house.

All night and all the next day they flew over the snow, stopping only to eat and for a little sleep stretched out on sweet-smelling hay in someone's barn. On the second night, they stopped at the largest house in the countryside where a ball was to be held.

The musicians, who had had no more sleep than the others, launched into the liveliest of dance music. Manya, charming in her velvet jacket and puffed sleeves, found as her partner a handsome young man in a white embroidered coat. For those hours he seemed to her the prince of her dreams, though she never saw him again. They danced until eight in the morning. Manya was not tired at all.

This wonderful year of gaiety was to last little Manya for a very long time.

Marie Curie

Born in Poland while it was under oppressive Russian rule, Marie Curie overcame incredible obstacles to become the first person to win the Nobel Prize twice. However, there was far more to her great mind than the work she did with radium and radioactivity. *Marie Curie* is an enlightening look into the life of one of history's most prominent and extraordinary scientists.

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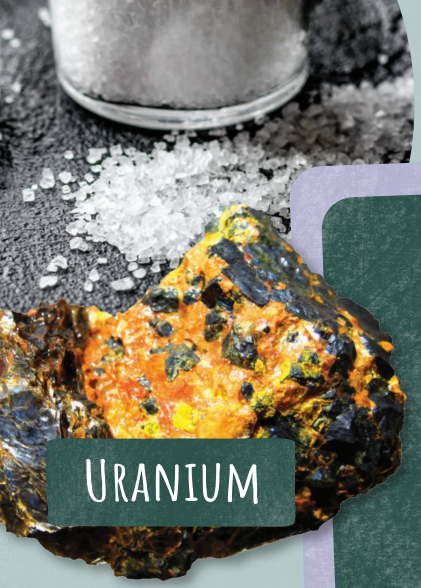

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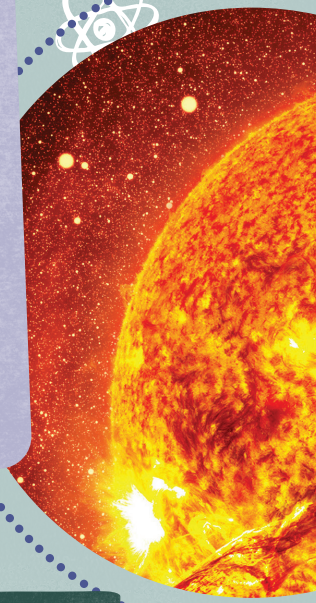

Erin Sprout and Isaac M. Hagenbuch, PhD

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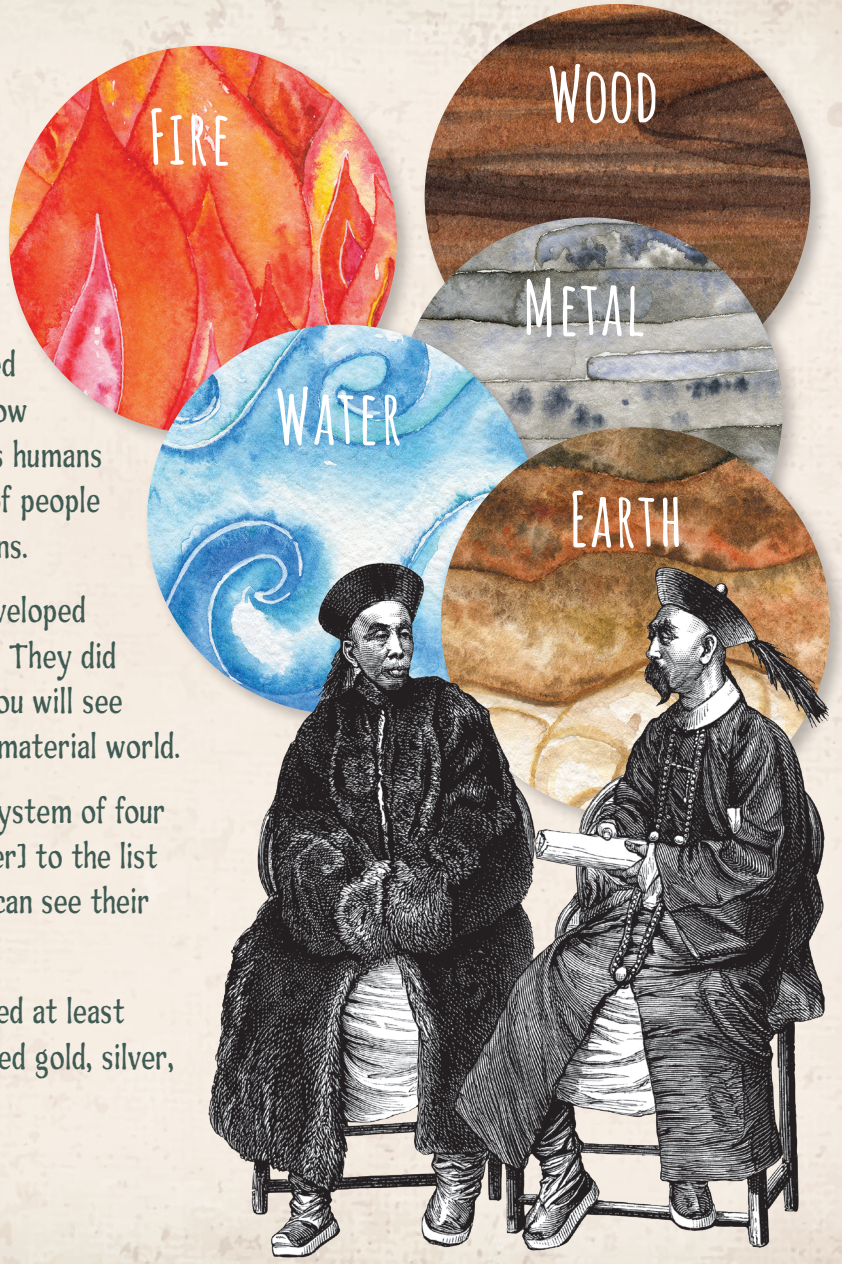
When did humans start studying the elements?

The Lord created humans as curious creatures. We have always asked fundamental questions like "What is the earth made out of?" and "How do the heavens move?" This inquisitive nature is part of what makes humans different from all other life. In the ancient world, different groups of people had different ideas about the answers to these fundamental questions.

In the Far East, the Chinese asked questions about the earth and developed answers based on five elements: wood, fire, earth, metal, and water. They did not mean the same thing as modern people do by "elements," but you will see the Chinese weren't alone in the pursuit of the constituents of the material world.

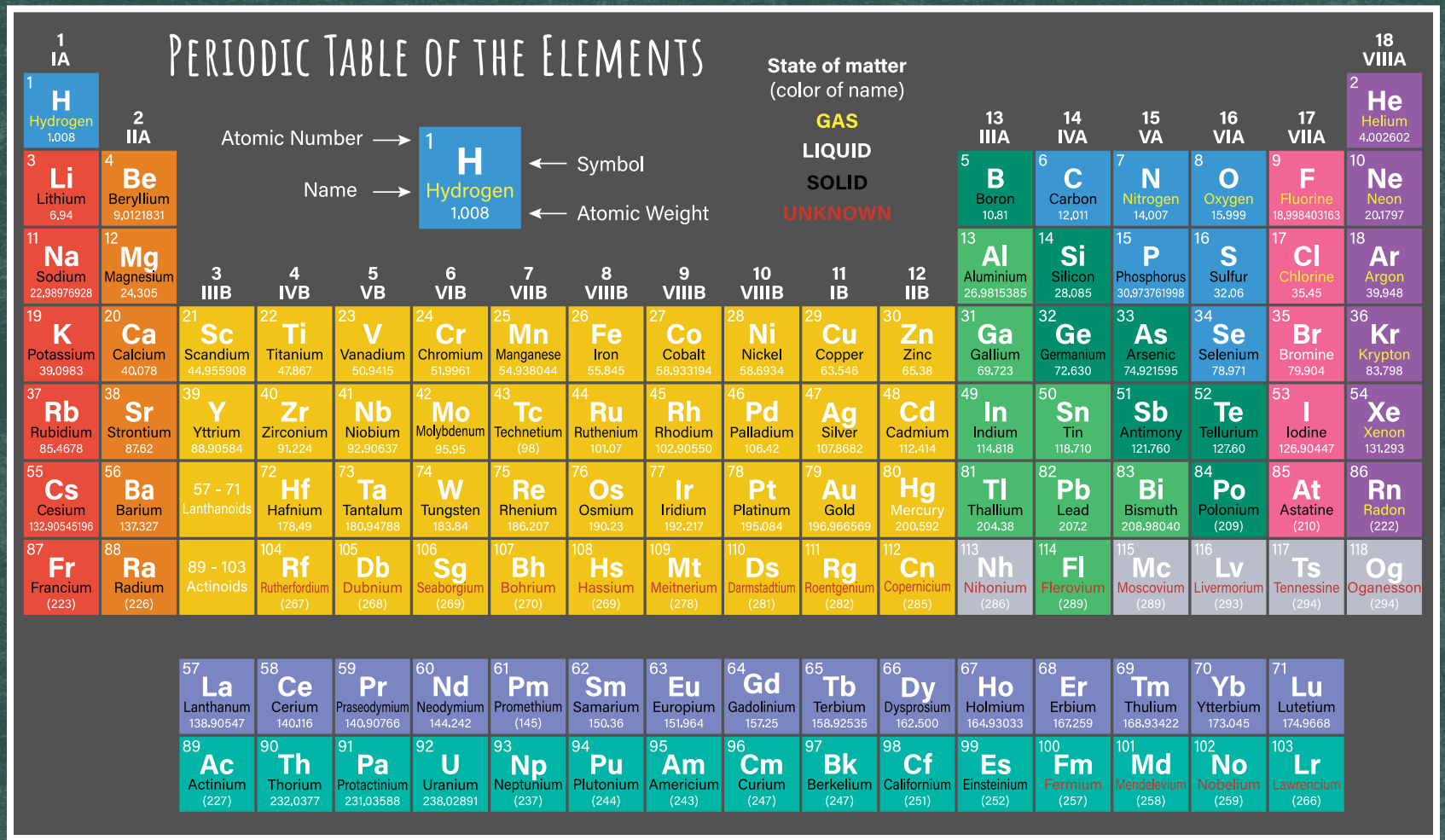
At the same time as the Chinese, some ancient Greeks developed a system of four elements: fire, earth, air, and water. Aristotle added "æther" [EE-ther] to the list to explain how stars and planets move through the sky and how we can see their light.

But what do we call elements nowadays? Well, ancient man discovered at least nine of them, though they weren't known as elements. These included gold, silver, copper, iron, lead, tin, mercury, sulfur, and carbon.



Alkali Metal | Alkaline Earth Metal | Transition Metal | Post-Transition Metal | Metalloid

Lanthanide | Actinide | Nonmetal | Halogen | Noble Gas | Unknown Chemical Properties



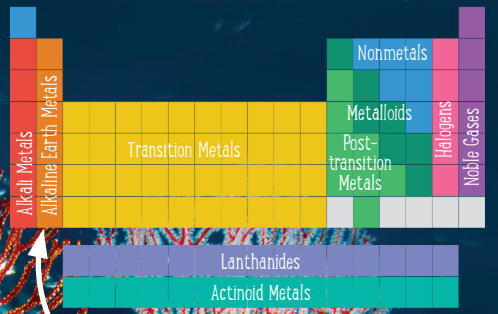
Lithium

Lithium (Li) is another element for which we have many uses! It can be given in a pill to people with certain mental illnesses to relieve their symptoms. The power of lithium has been harnessed in the form of lithium-ion battery technology, which is used in many things from flashlights to electric vehicles. Lithium is refined by mining and processing spodumene [SPOD-you-mean], also known as lithium aluminum silicate, which is found in only a few places on Earth.

Alkaline Earth Metals

Alkaline earth metals are usually shiny white or gray and are solid. They include beryllium (Be), magnesium (Mg), calcium (Ca), strontium (Sr), barium (Ba), and radium (Ra).

Calcium is an important element in our bodies. It gives strength and structure to bones! It is also the same element that makes some corals hard.



4	Be	Beryllium	9.0121831
12	Mg	Magnesium	24.305
20	Ca	Calcium	40.078
38	Sr	Strontium	87.62
56	Ba	Barium	137.327
88	Ra	Radium	(226)

Murky Mercury

Mercury (Hg) is toxic to living things. Because of this, mercury is used in an antiseptic that can stop the spread of harmful bacteria. Mercury has long been known as "quicksilver" for its metallic sheen and swiftly flowing liquid form at room temperature. Many cultures believed that it conferred health benefits.

Q: Many element symbols are derived from their name. Why is tungsten given W as a symbol?

A: Because when it was first identified as an element in 1781, it was called wolfram!

The first emperor of China, Qin Shi Huang, is thought to have died in 210 BC from mercury poisoning. He drank an elixir of mercury because he thought it would give him eternal life. His tomb hasn't been explored, but scientists have detected a potentially large amount of mercury from soil samples taken in the area.

Mercury

Many post-transition metals are used as alloys—metals added to each other to create a new material.

Post-transition metals have other metals added to them to strengthen them and make them usable. For example, pure aluminum (Al) was once used in power lines, but because it broke too easily, aluminum alloy 6201 is commonly used instead. This alloy contains 98.5% aluminum, 0.8% magnesium, and 0.70% silicon.

Aluminum is very recyclable!

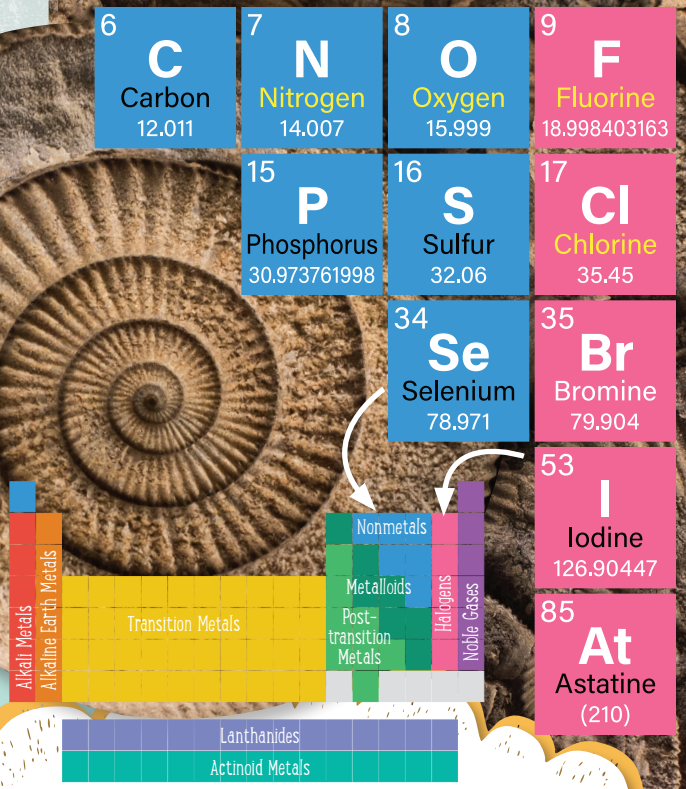
It can be melted down and combined with other elements to make new things. Almost all aluminum can be reused without wasting much of it.

Aluminum

Nonmetals

In addition to carbon (C), nitrogen (N), oxygen (O), phosphorus (P), sulfur (S), and selenium (Se), the nonmetals group also includes the elements that make up the halogens group—fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At).

This group includes some very familiar and important elements! Some of these are essential for life.



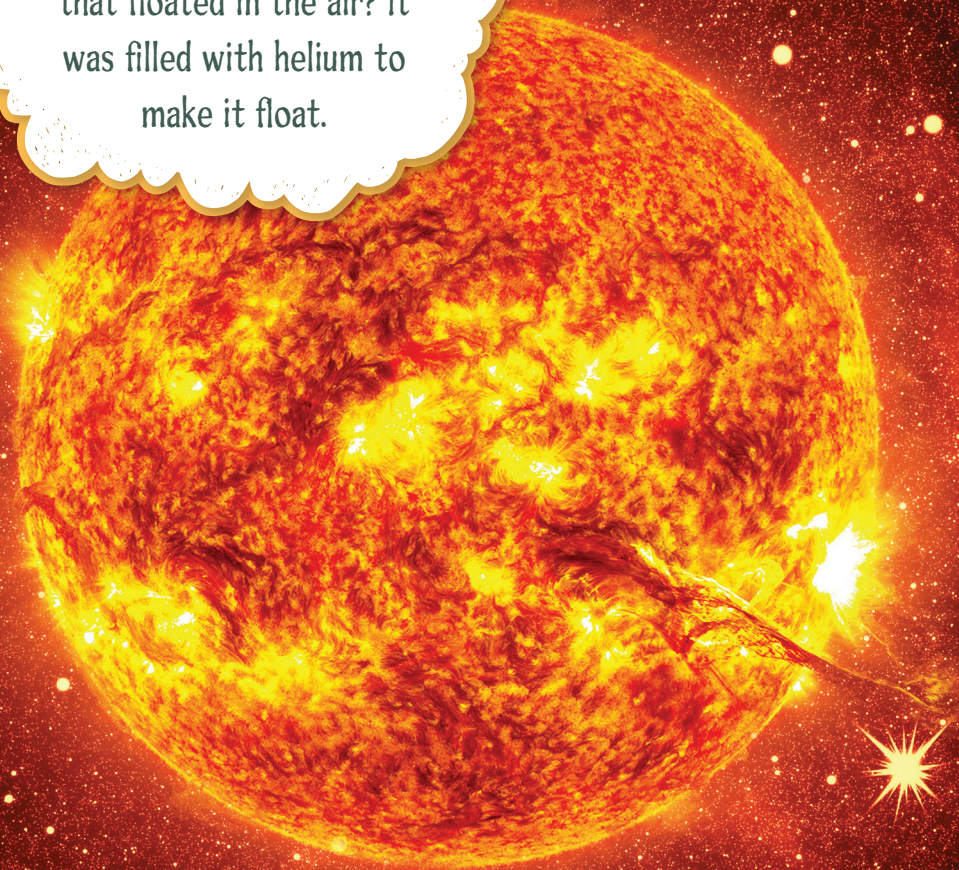
Carbonized fossils are formed when an organism's remains are exposed to intense pressure and heat, releasing gases and liquids and forming a hard, fossilized imprint of the organism's silhouette. This imprint is preserved in a thin layer of carbon.

Hello, Helium!

Helium (He) is the most abundant and common element in the universe after hydrogen. It is named for Helios, the mythical Greek god of the sun, because helium is a large component of the sun.

Helium, which has only two protons in its nucleus, is made by the fusion of two hydrogen atoms. This fusion gives off tremendous energy and is believed to be the chemistry powering our sun and other stars. Maybe someday humans will master fusion as an energy source!

Have you ever had a balloon that floated in the air? It was filled with helium to make it float.



The BOOK of ELEMENTS

Have you ever wondered what the earth, planets, and stars are made of? In *The Book of Elements*, you will be taken on a journey through God's orderly creation, where elements are clearly defined and behave in predictable ways. We will encounter the periodic table and learn how and why the elements are organized.

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In this book, you will encounter some of the greatest scientific achievements, some fascinating questions, and some facts:

- Where do the sun's light and heat come from?
- What do ancient plumbing and car batteries have in common?
- What do ancient Roman engineering and the Empire State Building have in common?

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THE STORY OF ALICE BALL

BY JENNIFER LERUD

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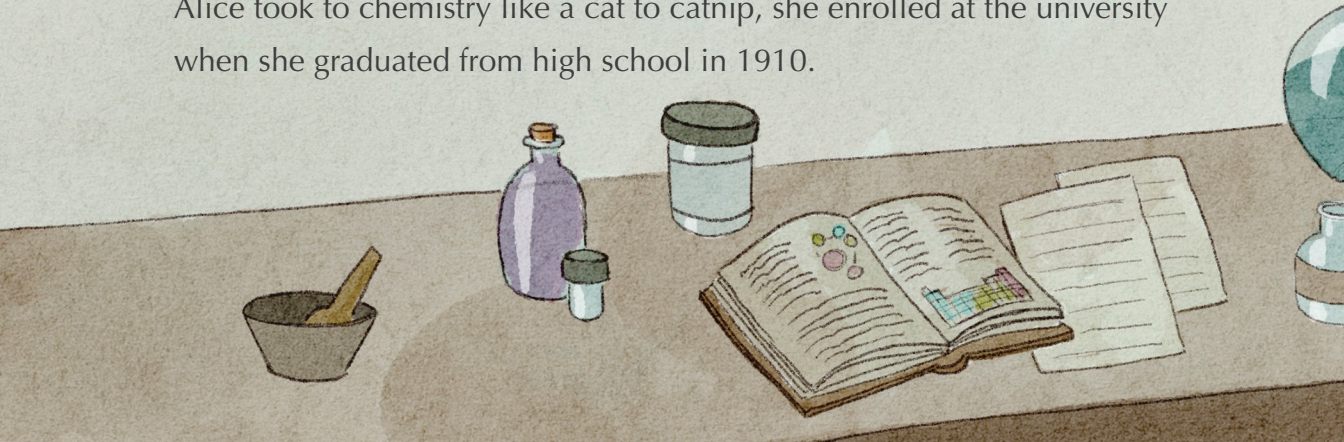
Flash! The camera went off.

Taking pictures was their family's specialty. Alice's father, James Presley Ball, Jr., had a photography studio in Seattle, and he was an editor and a lawyer, too. He'd learned photography from his father, one of the first black men to take daguerreotype pictures in the USA. Alice was very proud of her father, but Grandpa was famous! He'd taken pictures of famous people like Frederick Douglass, Queen Victoria, Jenny Lind, P.T. Barnum, Charles Dickens, and more.

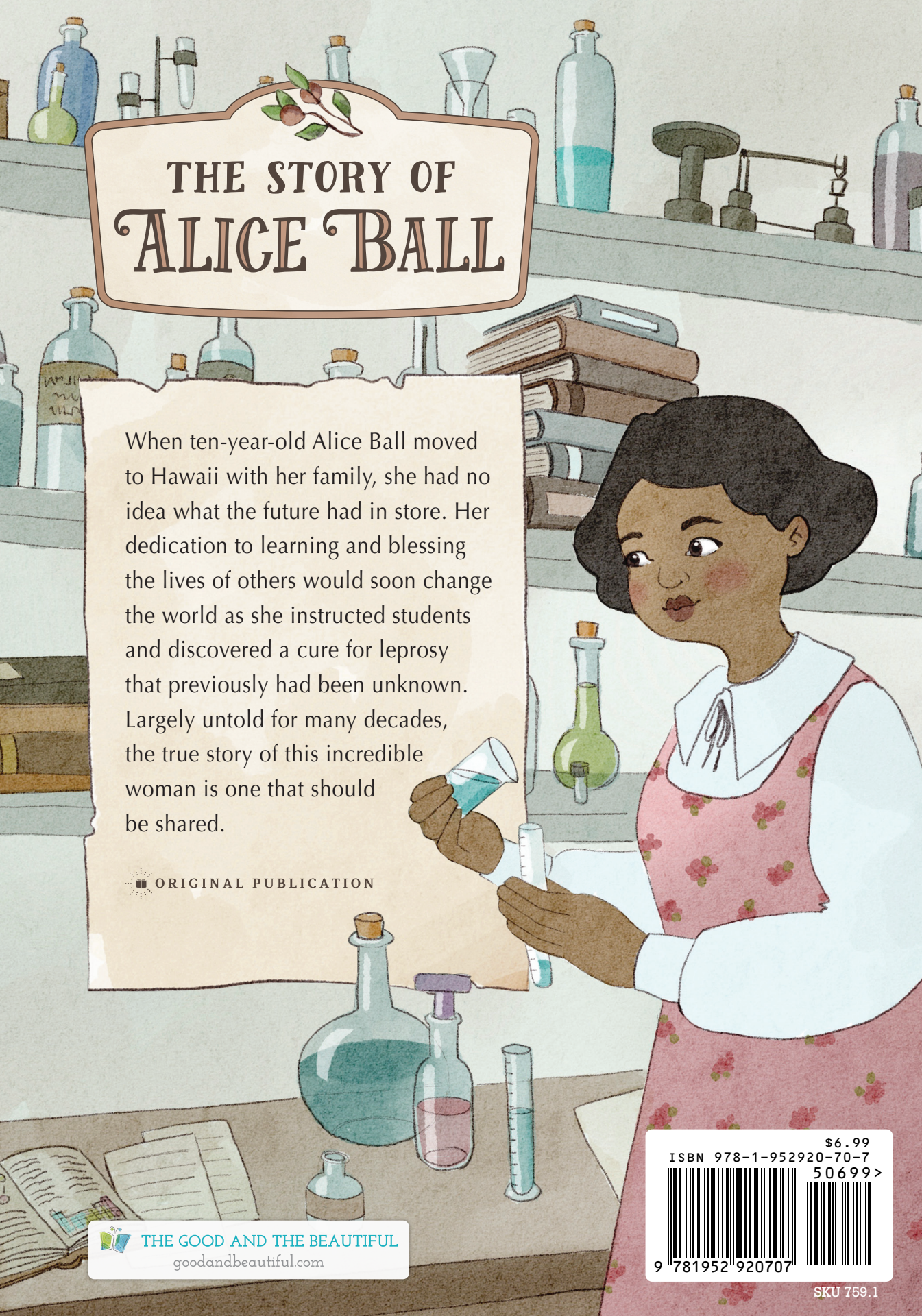
After taking a few more pictures, they boarded the boat. Grandpa moved slowly up the gangplank. He was in awful pain because of his arthritis. They hoped Honolulu's climate would help him feel better. That's why they were all moving there with him.

Back in Seattle, Alice enjoyed learning, especially science. At the time, there was a push in Seattle to have high school students learn chemistry to help the booming pharmaceutical business. The local University of Washington specialized in the sciences too, especially chemistry. Since Alice took to chemistry like a cat to catnip, she enrolled at the university when she graduated from high school in 1910.



One day a medical doctor came to visit Alice. Dr. Harry T. Hollmann worked with leprosy patients, and he'd heard about her work with awa root (kava root). Would she help him to separate the oils of the chaulmoogra plant and find a better treatment for lepers?

Chaulmoogra had been used in Asia as a remedy for leprosy for thousands of years, but some people thought eating or drinking chaulmoogra was worse than the leprosy they suffered from! A breakthrough came in the early 1900s, when Dr. Frederick B. Power successfully separated the plant's essential oils for inoculation, but the oils were not absorbed well and caused painful sores and lumps. A better way had to be found!



When ten-year-old Alice Ball moved to Hawaii with her family, she had no idea what the future had in store. Her dedication to learning and blessing the lives of others would soon change the world as she instructed students and discovered a cure for leprosy that previously had been unknown. Largely untold for many decades, the true story of this incredible woman is one that should be shared.

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