

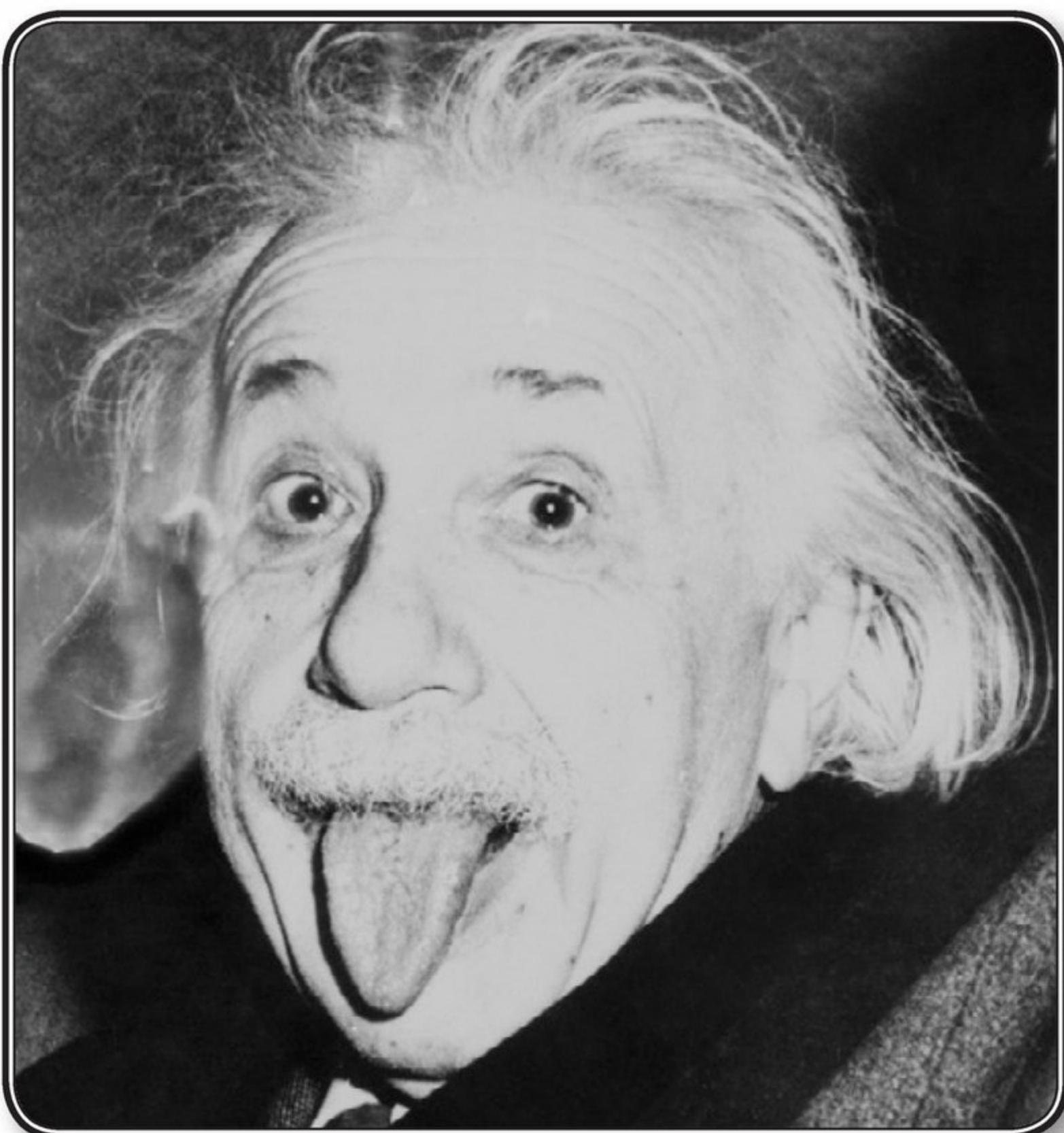
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Albert Einstein

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Written by Michael Emerson

Albert Einstein

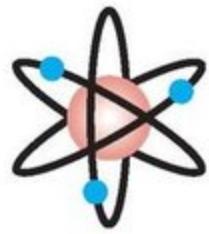


Written by Michael Emerson

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Deeply Hidden Things

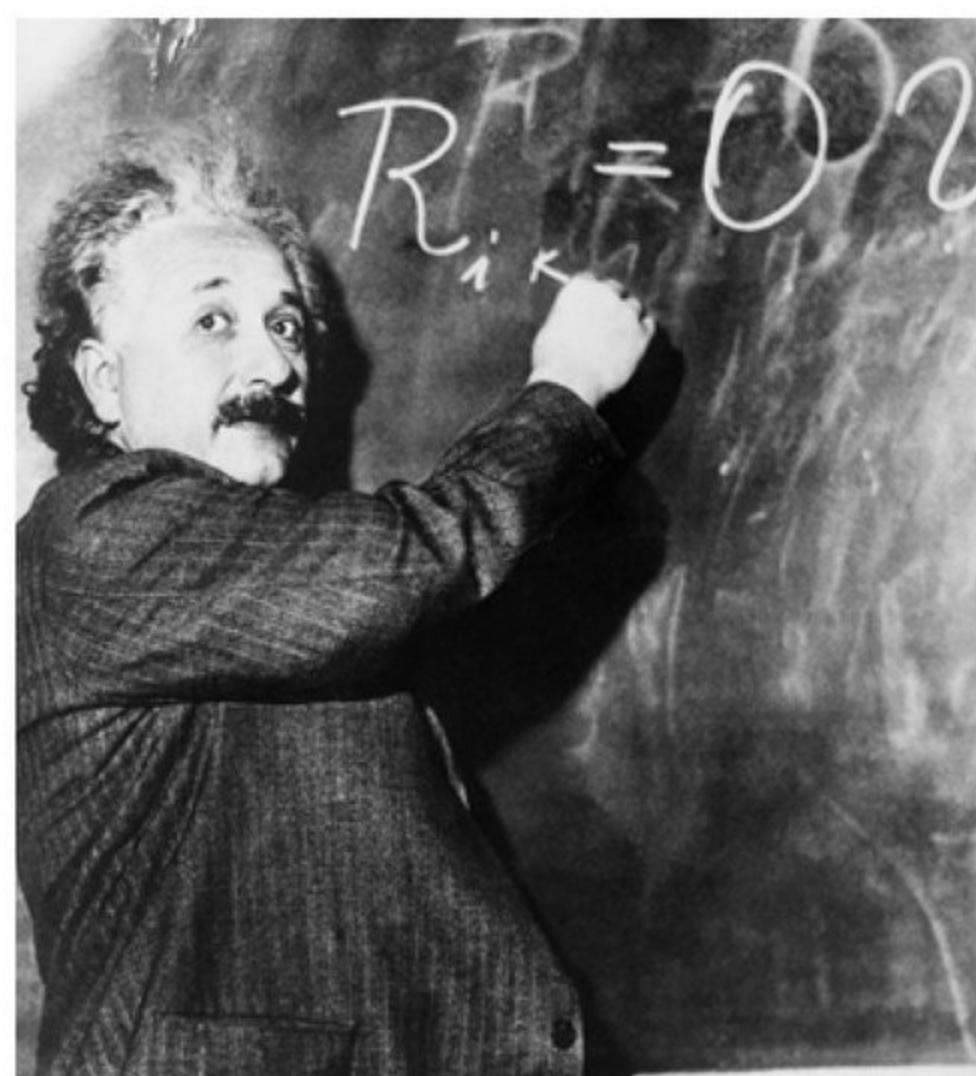


“Knowledge of what is does not open the door directly to what should be.”

When Albert Einstein was five years old, his father showed him a magnetic **compass**. Watching its floating movement aroused his curiosity. What did it mean? Why did the compass's needle stay still while his father turned its casing around and around?

At the time, Einstein was too young to understand the answer, but he never forgot that feeling of wonder and mystery.

Later, he wrote that watching the compass had taught him an important lesson—that “something deeply hidden” had to be “behind things.” That curious little boy grew up to become a curious scientist who spent his life trying to identify that “something.” By continuing to pursue his curiosity, Albert Einstein forever changed the way people think about the **universe** in which they live.

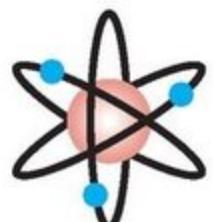


Einstein's curiosity about complex problems led to great discoveries.



Einstein played the violin from childhood through adulthood.

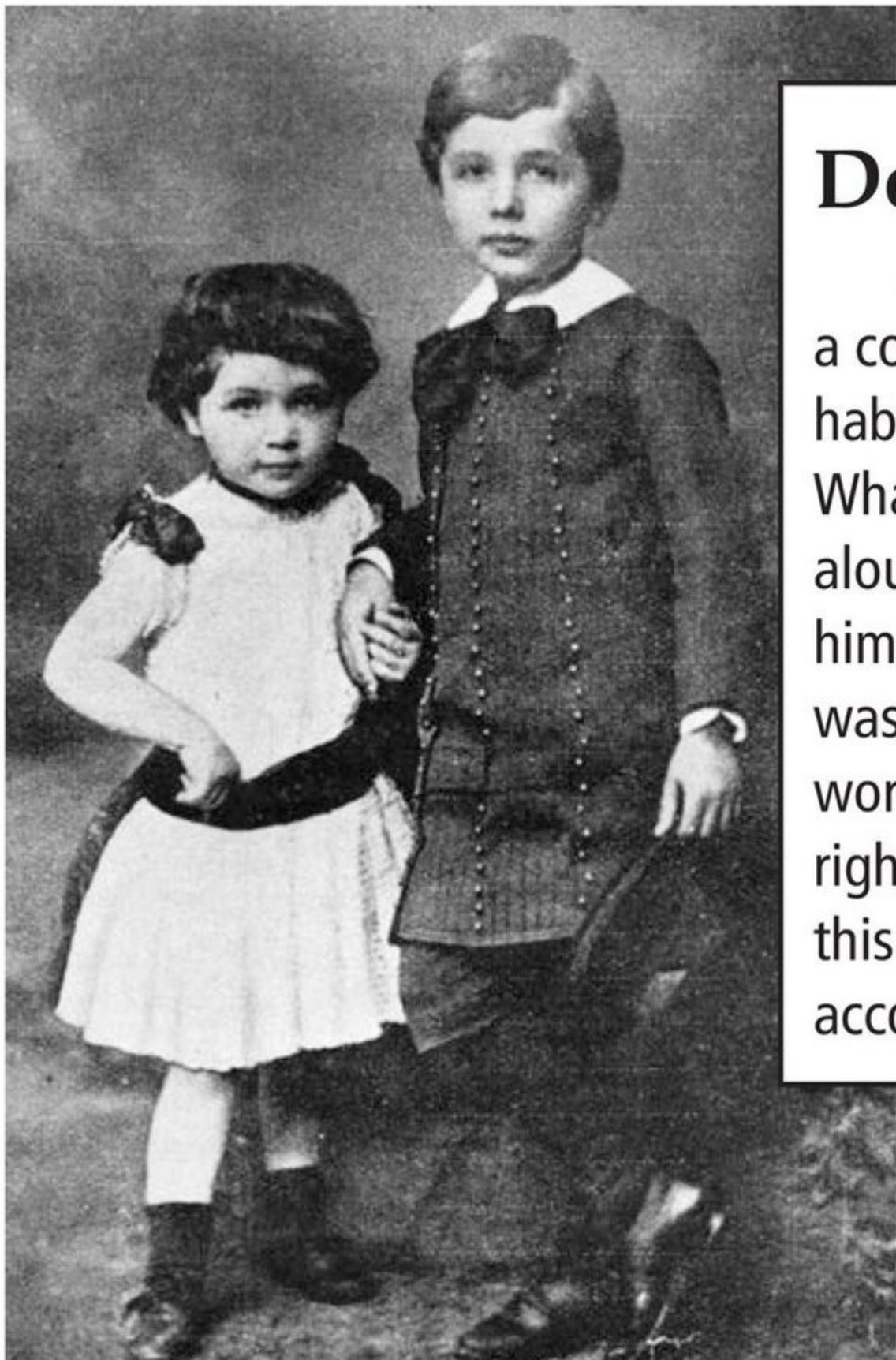
A Talented, Curious Boy



*"A table, a chair, a bowl of fruit, and a violin;
what else does a man need to be happy?"*

Albert Einstein was born on March 14, 1879, in the small town of Ulm, Germany. The next year, the family moved to the larger city of Munich. There, Albert's younger sister, Maja, was born. She would become his closest childhood friend.

Einstein's family had a strong influence on his life. His mother, Pauline, played the piano. When Albert was six, she encouraged him to take up the violin. Although he didn't enjoy the structured lessons of his music teacher, he loved playing the instrument. His violin would be a constant companion for the rest of his life.

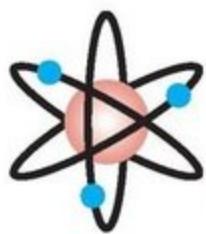


Do You Know?

As a child, Einstein had a common childhood speech habit that worried his parents. Whatever the young Einstein said aloud, he would often repeat to himself in a very quiet voice. It was as if he was "rechecking his words" to see if they sounded right. Eventually he outgrew this habit and became an accomplished public speaker.

Albert Einstein with his sister, Maja

Other family influences also shaped his future. Einstein's father and two of his uncles were electrical engineers. They introduced Einstein to math and science at an early age. One of his uncles taught him the basics of **algebra** by making it into a game. A family friend brought him science books. Einstein would **pore** over the books for hours at a time. He especially liked a book about geometry. Even as a child, Einstein had the ability to concentrate deeply. He would pursue complicated problems until he was satisfied that he had considered every solution.



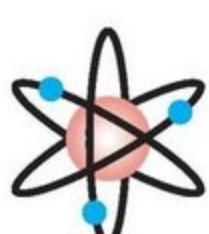
“Teaching should be such that what is offered is perceived as a valuable gift and not as a hard duty.”

In school, Einstein's talent for math and science was apparent immediately, but so was his individuality. He questioned the way his school's instructors taught him. German schools, like much of life in Germany at the time, were run with strict discipline. To young Einstein, the teachers seemed like army sergeants who only drilled their students to memorize useless information and lifeless facts. Einstein preferred thinking creatively.



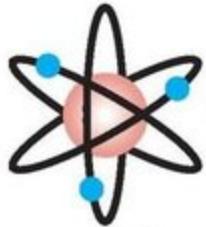
Einstein's creative thinking was honored with a U.S. stamp.

When he was only 17 years old, Einstein was accepted at one of the finest scientific universities in Europe. Once again, Einstein's curiosity about how and why things worked led him to determine his own course. He often skipped routine lectures to spend more time in a laboratory developing his own ideas. Most of his university professors agreed that their brilliant young student might have a very bright future if only he would do as he was told.



“Imagination is more important than knowledge.”

The Patent Office



"I never think of the future. It comes soon enough."

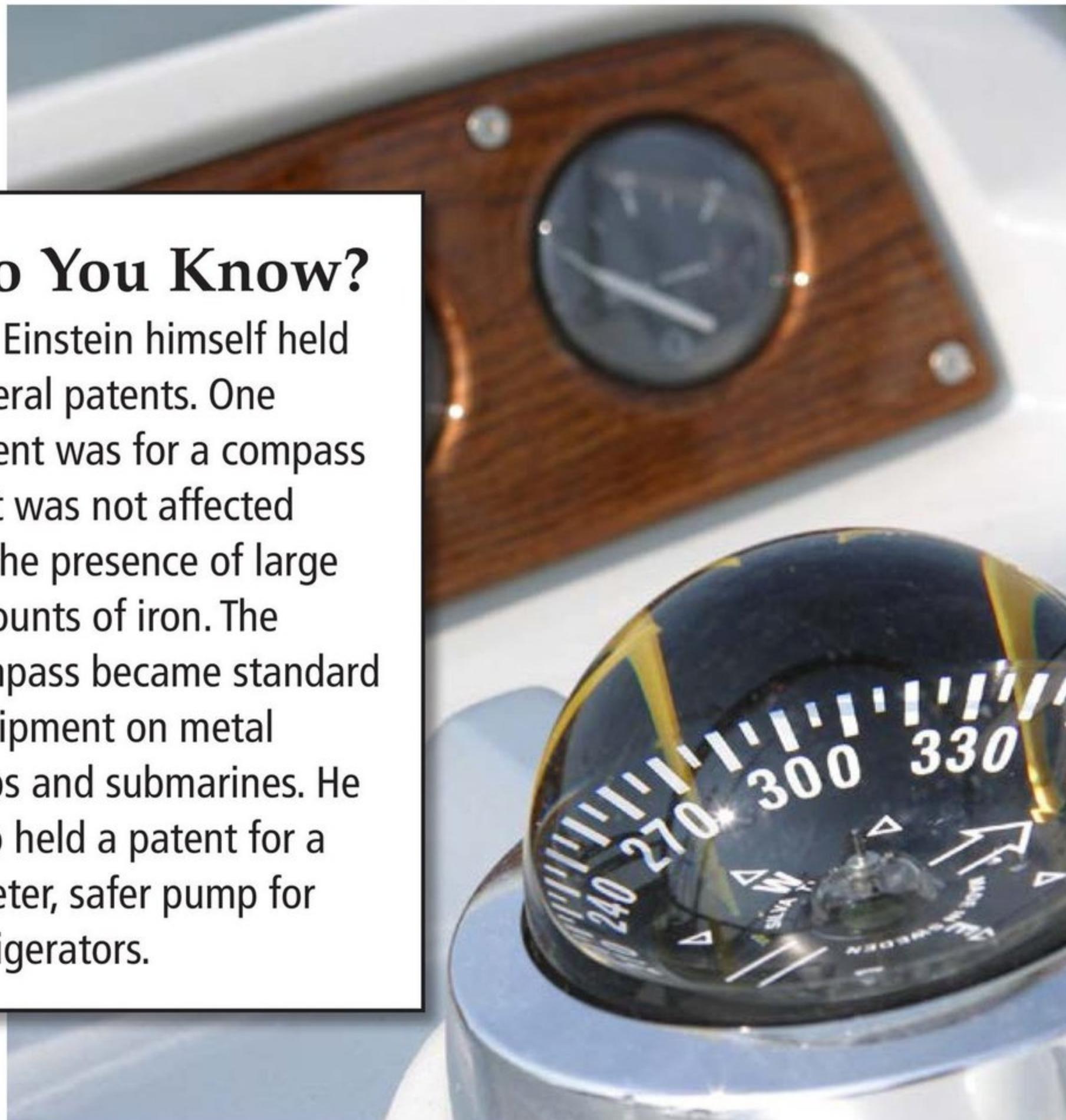
Surprisingly, Einstein had trouble finding a job after finishing school in 1900. He had been a bright student. He had graduated from one of the finest universities in Europe. However, his strong sense of independence and his curiosity had made him unpopular with the same teachers who could help him find work. A teaching position would have given him the freedom to pursue further study. While he felt the lack of one was a setback, he did not give up his interest in science. He had ideas that he wanted to think through and test. He just needed to find the time and place to pursue them.

Einstein found that time in 1902. That year he took a job in a **patent** office in Bern, Switzerland. His unusual job was to make sure that new devices submitted for patent **certification** worked the way their inventors said they did.

The job in the patent office allowed Einstein to do what he did best—pursue his curiosity and question the ideas of others. On his first day at work, Einstein's boss told him, "When you pick up an application, think that anything the inventor says is wrong."

Do You Know?

Einstein himself held several patents. One patent was for a compass that was not affected by the presence of large amounts of iron. The compass became standard equipment on metal ships and submarines. He also held a patent for a quieter, safer pump for refrigerators.

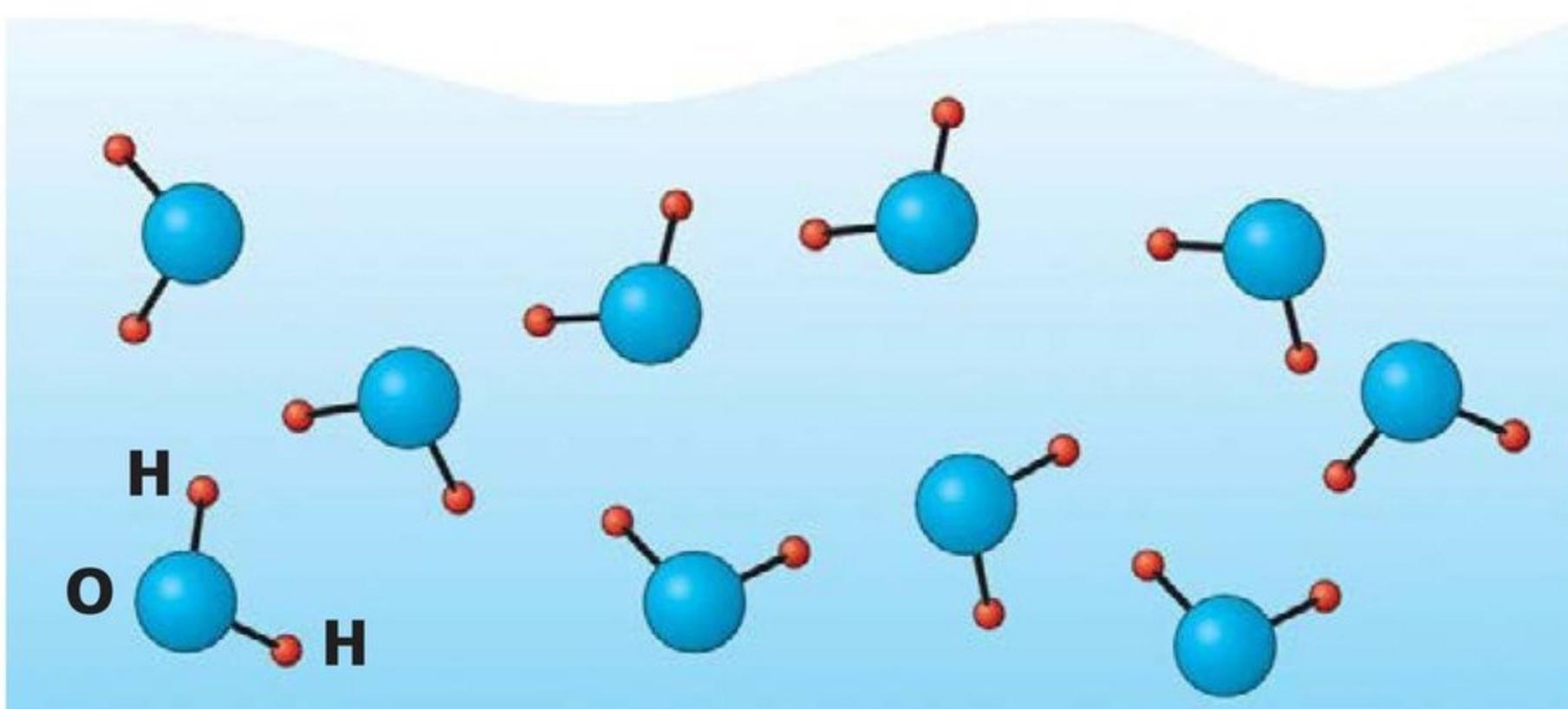


The secure income and regular working hours gave Einstein the freedom to work on his own ideas. In his spare time, he met with a group of friends who shared his curiosity about the scientific ideas of the day. They called themselves the Olympia Academy. Their enthusiastic group often met until late in the evening, talking and socializing in cafes or in Einstein's apartment. It was during those years of steady work and strong friendships that Einstein began to develop ideas that would change science forever.

The Miracle Year

By 1905, Einstein had worked in the patent office for three years. During that time his curiosity thrived, and he applied a great deal of thought to new scientific **theories**. He soon felt confident enough in his ideas to share them.

Einstein sent papers explaining his ideas to the leading German scientific journal of the time. The journal published the first of these papers in March 1905, and four additional papers soon followed. Einstein's first paper explained his theory about the nature and behavior of light. The second and third papers proved the existence of tiny parts of matter, called **molecules** and **atoms**, and described how they moved. The final two papers offered new explanations for understanding the relationships that existed among space, time, and objects in motion.



Water molecules contain two hydrogen atoms and one oxygen atom.

Scientists were **astounded** by what they read. In six months, Einstein changed the way they had thought about the universe for over two hundred years! They were equally amazed that these ideas came not from a professor of **physics** at a major university, but from a curious, 26-year-old patent clerk.

As a direct result, Einstein's scientific career took off in many directions. He was energized by the attention his work received from the scientific community and by the opportunities he gained. He received invitations to speak at scientific meetings and to explain his new ideas. The 1905 Nobel Prize winner in physics contacted Einstein to congratulate him. A well-known professor of physics named Max Planck even began to teach Einstein's ideas to his students. In time, 1905 came to be known as Einstein's "miracle year."

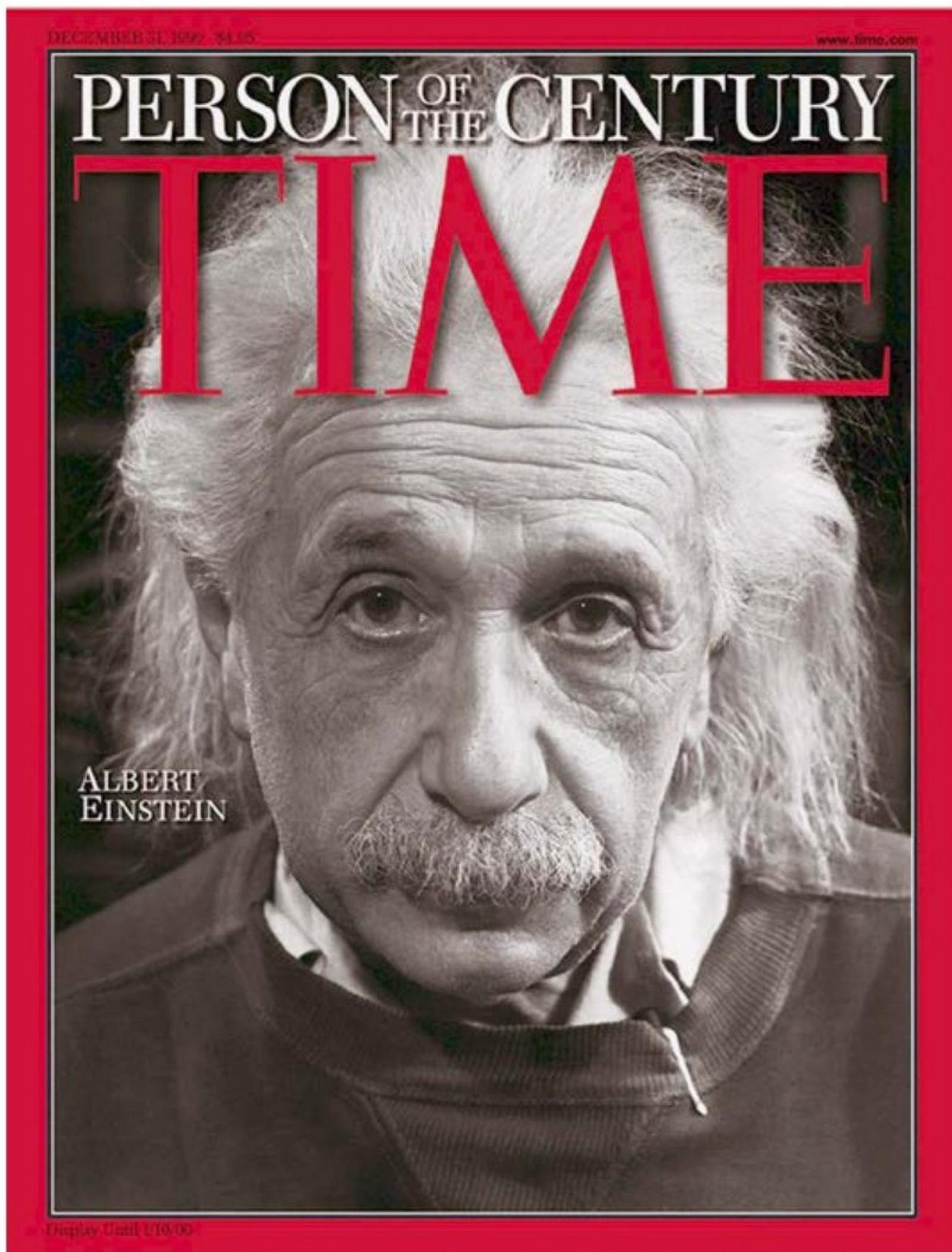


Physics professor Max Planck even taught Einstein's theories in his university classes.

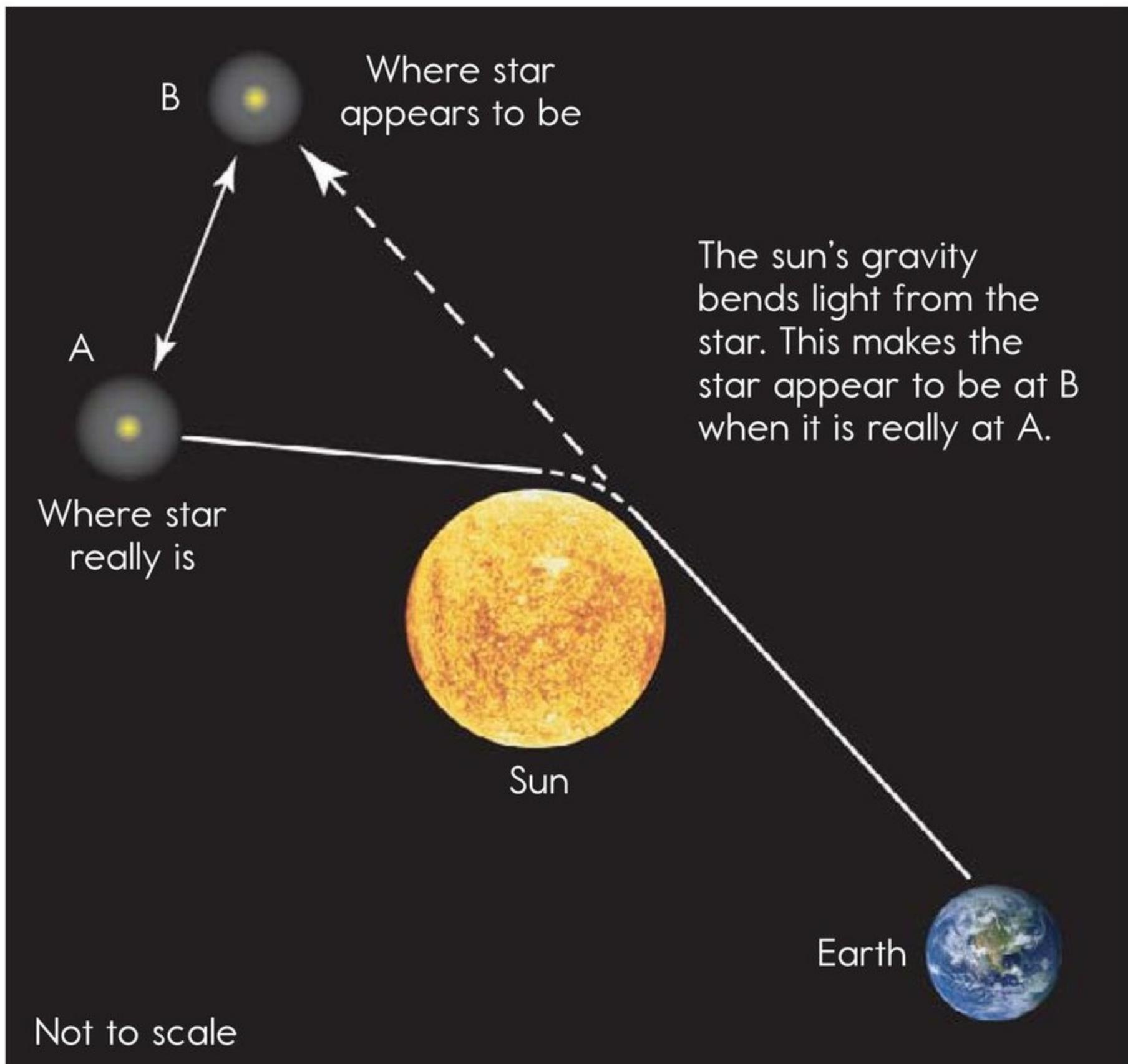
Einstein continued to work at the patent office until 1909. That year, he finally received an offer of a full-time job at a university. Einstein took the job, but then jumped from school to school for the next few years while he searched for the ideal place to pursue his research.

Meanwhile, he continued to develop and refine his earlier ideas in new ways. It was difficult work, and Einstein often thought he was on the wrong track. In fact, his ideas were so new and so unfamiliar that he said they almost drove him insane. Then, in 1915, he had a breakthrough. He finally figured out how to unite his earlier ideas into one system, which he called the General Theory of Relativity.

Einstein's ideas once again excited scientists around the world. Before long, his ideas would begin to reach a much wider audience than he ever thought possible. In 1919, British scientists tested Einstein's theory of relativity by measuring the position of a star during a solar eclipse. If Einstein's theory was correct, the star would appear to be in one position while it was actually in another. The star appeared almost exactly where Einstein said it would be!



Newspaper headlines around the world announced the findings. A British newspaper declared, “**R**evolution in Science—New Theory of the Universe.” A German newspaper called Einstein a “new celebrity in world history” and said that his ideas were “a complete revolution in our concepts of nature.” Overnight, Albert Einstein became one of the most famous people in the world.



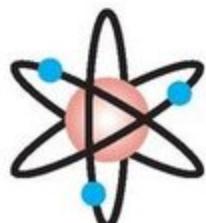
Despite his success, not everyone was pleased with Einstein. Many scientists had built their careers on the ideas that Einstein had tossed aside. Others did not want to believe Einstein's theories because they would be difficult to test in a laboratory. Some people were simply prejudiced against Einstein because of his cultural background.

Einstein took this **criticism** in stride. He knew that his theories were not perfect. Yet with each new paper, more and more people came to believe in the importance of his work.



News reporters greet Albert Einstein and Elsa, his wife, arriving in New York in 1921.

The Uses of Fame



*“Try not to become a man of success
but a man of value.”*

As Einstein's fame grew, so did the demand for interviews, photographs, speeches, and new writings. Einstein had mixed feelings about all this distracting attention. These demands took up time that he could have spent pursuing new research. He also knew that many people would misunderstand his ideas no matter how carefully he explained them.

Despite his concerns, Einstein knew that his fame could be used to open other people's minds and to bring his ideas to a wider audience. The more speeches and interviews he gave, the more people would hear and try to understand the world as he saw it.

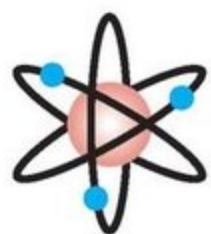
Einstein also knew that he could use his fame to draw attention to issues he cared about outside of science. One of Einstein's most deeply held beliefs was that war should be avoided if at all possible. In 1914, he was one of only three scientists who signed a letter opposing Germany's participation in World War I. More than 100 scientists had signed a letter in support of Germany entering the war. Now that he had the world's attention through his scientific work, he stepped up his antiwar efforts. He worked with international groups working for peace and wrote about his antiwar beliefs. When Germany began preparing for war again in the 1920s and 1930s, Einstein continued to speak out.

Do You Know?

In the 1930s Einstein began to publish a series of articles for general audiences titled *The World as I See It*. The collection covered topics from war and liberty to progress and education—not just science.

Einstein also believed strongly in creating a new Jewish country, to be called Israel, in the Middle East. Beginning in 1921, he became more visible in his support of the Jewish national cause. In 1952 he was offered the presidency of the new country of Israel, which he respectfully declined.

Coming to America

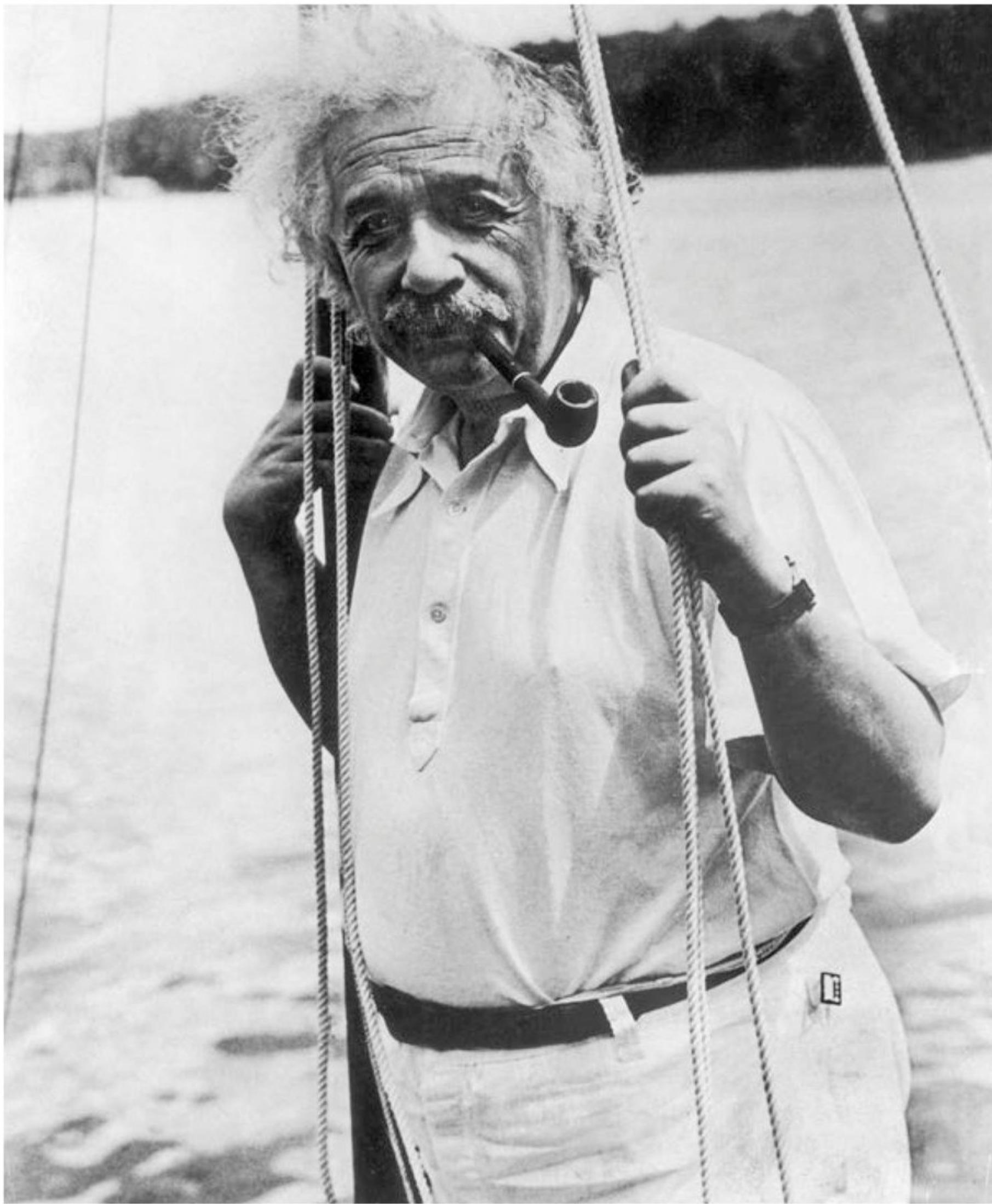


"The most important motive for work in school and in life is pleasure in work, pleasure in its result, and the knowledge of the value of the result to the community."

Despite the efforts of Einstein and others to promote peace, Germany moved closer to war in the 1930s. Until that point in time, the German government had merely tolerated Einstein and his criticism of its plans. Einstein knew that this tolerance would not last. In 1933, he left Germany and took a job at Princeton University in the United States.



Einstein meets with Jawaharlal Nehru, prime minister of India, at Einstein's home in Princeton, New Jersey, in 1949.



Einstein enjoyed sailing, and often took his boat out on Princeton's Lake Carnegie.

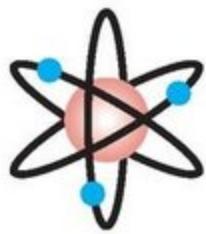
At Princeton, Einstein moved his family into a house close to his office. They soon became part of Princeton's close-knit community. When out-of-town visitors wanted to know where the great man lived, townspeople would ask, "Are you expected?" This question prevented strangers from bothering Einstein at home.

For the next 29 years, Einstein continued working to expand his ideas into new areas. Some people thought his efforts showed that he was losing touch. Einstein didn't pay much attention to this criticism. He believed that he could develop a new theory that would unify his original ideas with the latest theories. He remained dedicated to his work and ideas, yet he never achieved the sort of breakthroughs he'd had during the "miracle year" or with his General Theory of Relativity. Always in demand, he continued to give speeches, write articles, and meet regularly with fellow scientists.



Albert Einstein goes over matters with secretary Helen Dukas, who worked with Einstein from 1928 until his death in 1955.

Einstein's Influence



"Few are those who see with their own eyes and feel with their own hearts."

Einstein was not an inventor. Yet his curiosity led to the creation of many useful products. For example, Einstein's ideas about the nature and behavior of light led scientists to develop new ways to control light. These technologies eventually led to television cameras, remote controls for home electronics, and flat-screen computers.

Einstein was also the first person to think of laser light. This technology is now used in compact discs (CDs), digital video discs (DVDs), and supermarket checkout equipment. His proof of the existence of atoms and

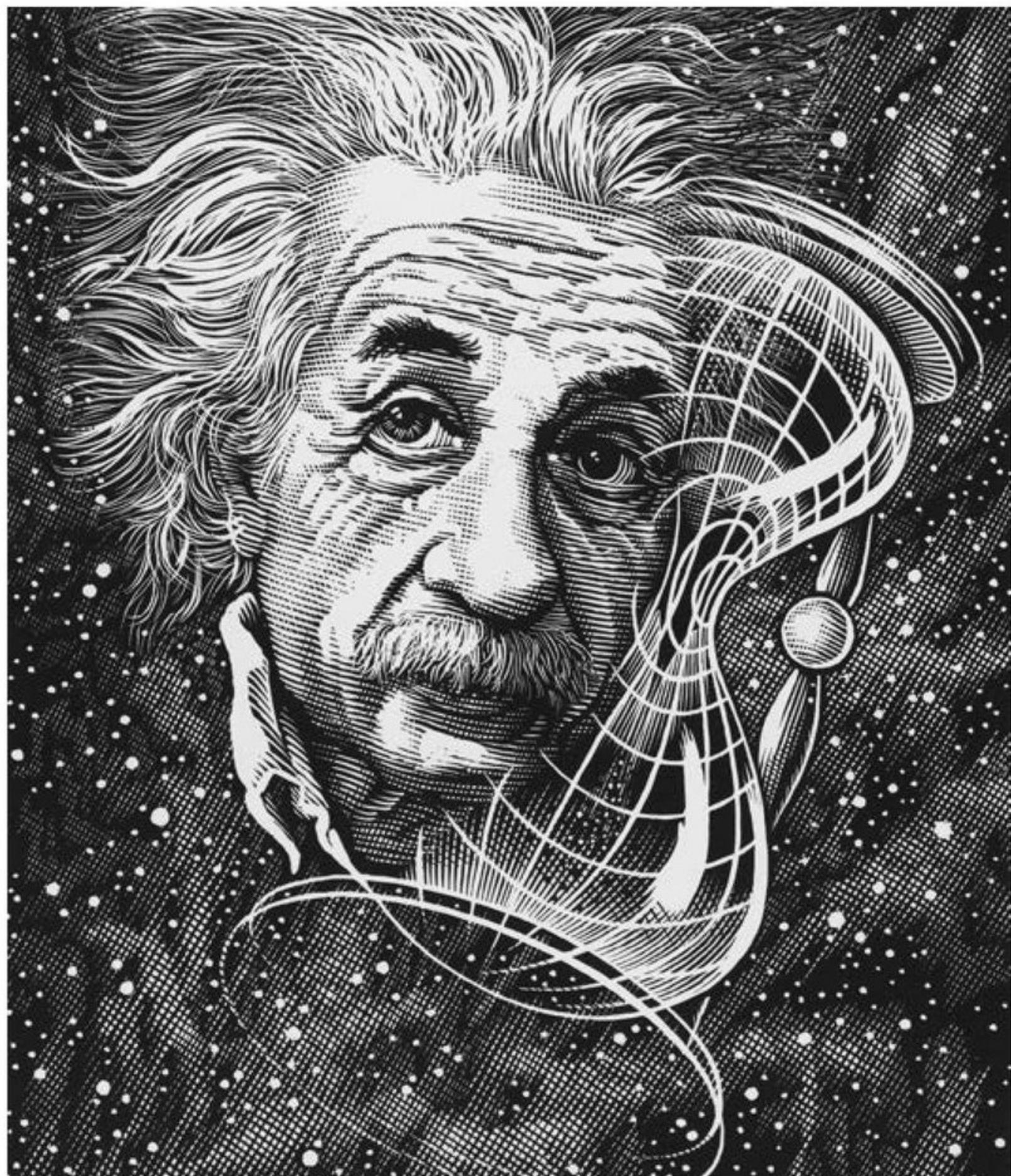
molecules led to the creation or improvement of a wide range of everyday products. Those products include shaving cream, toothpaste, personal computers, and portable phones.





Einstein's theories provide scientists with a framework to study space objects, such as the Helix Nebula.

Einstein's scientific ideas continue to influence new theories. Current ideas about the origins of the universe, the nature of space, and strange objects called black holes all owe a large debt to Einstein's work.



A Life Well Lived

Einstein once said, “The most beautiful experience we can have is the **mysterious**. . . . It is enough to try to understand a little of this mystery every day.”

Until his death on April 18, 1955, Einstein’s curiosity led him to work to understand nature’s greatest mysteries. In doing so, he changed the way people think about time, space, energy, and matter—the foundations of the universe.

Glossary

algebra (<i>n.</i>)	a branch of math in which symbols, usually letters, are used to represent unknown numbers (p. 6)
astounded (<i>v.</i>)	greatly amazed or surprised (p. 11)
atoms (<i>n.</i>)	tiny pieces of matter (p. 10)
certification (<i>n.</i>)	the process of receiving an official document showing that something works as claimed (p. 8)
criticism (<i>n.</i>)	the act of finding fault, or carefully judging for review (p. 14)
compass (<i>n.</i>)	a direction-finding tool with a needle that always points north (p. 4)
molecules (<i>n.</i>)	the smallest parts of a substance that are still identifiable as that substance (p. 10)
mysterious (<i>adj.</i>)	not easily understandable (p. 22)
patent (<i>n.</i>)	a document that grants an inventor the right to make money from an invention (p. 8)
physics (<i>n.</i>)	the scientific study of matter and energy (p. 11)
pore (<i>v.</i>)	to read with great attention (p. 6)
revolution (<i>n.</i>)	an overthrow of previous ideas or ways of doing things (p. 13)
theories (<i>n.</i>)	possible explanations (p. 10)
universe (<i>n.</i>)	all things that exist in space (p. 4)

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Back cover: Einstein receives a certificate of U.S. citizenship from Judge Phillip Forman in 1940.

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