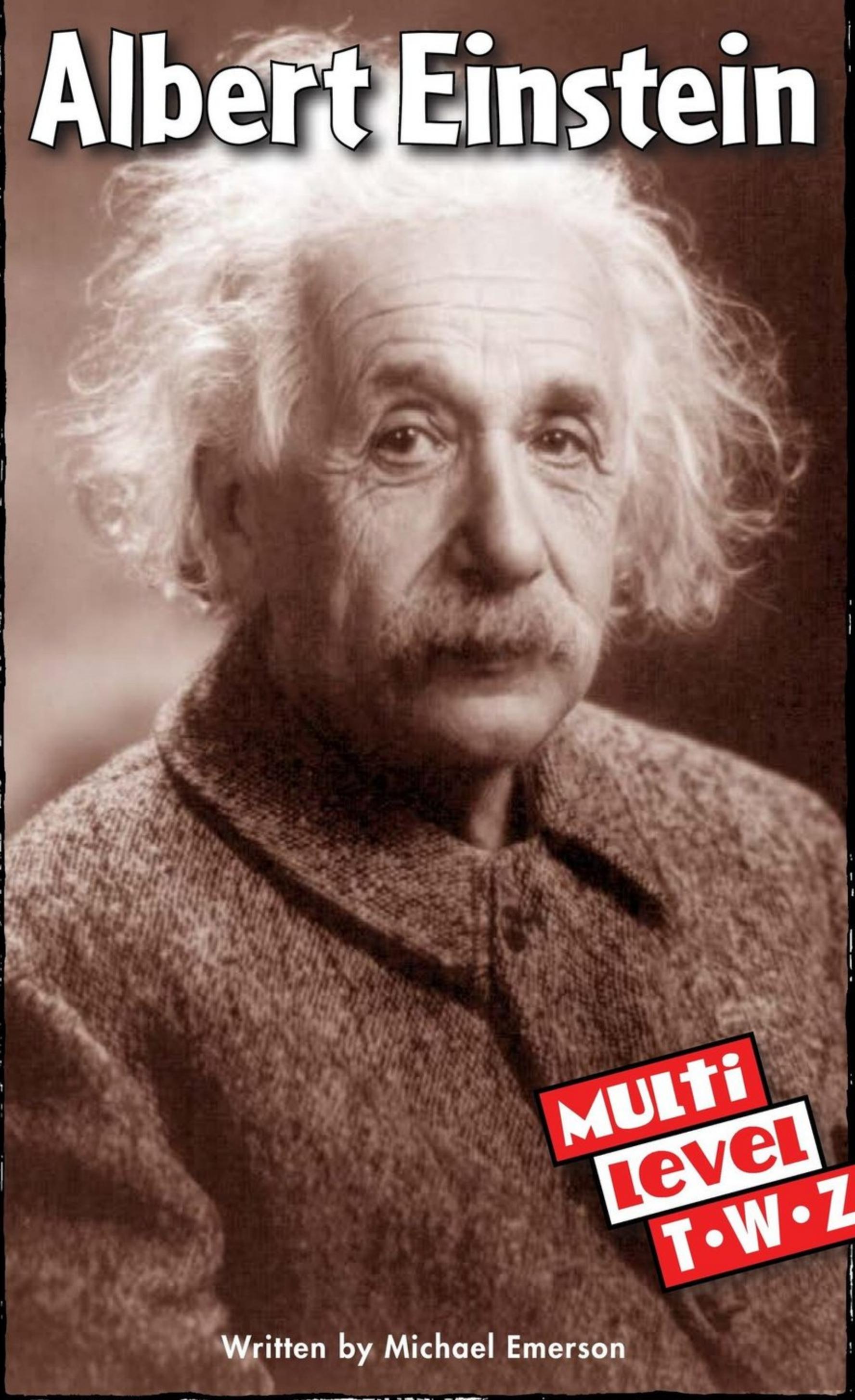


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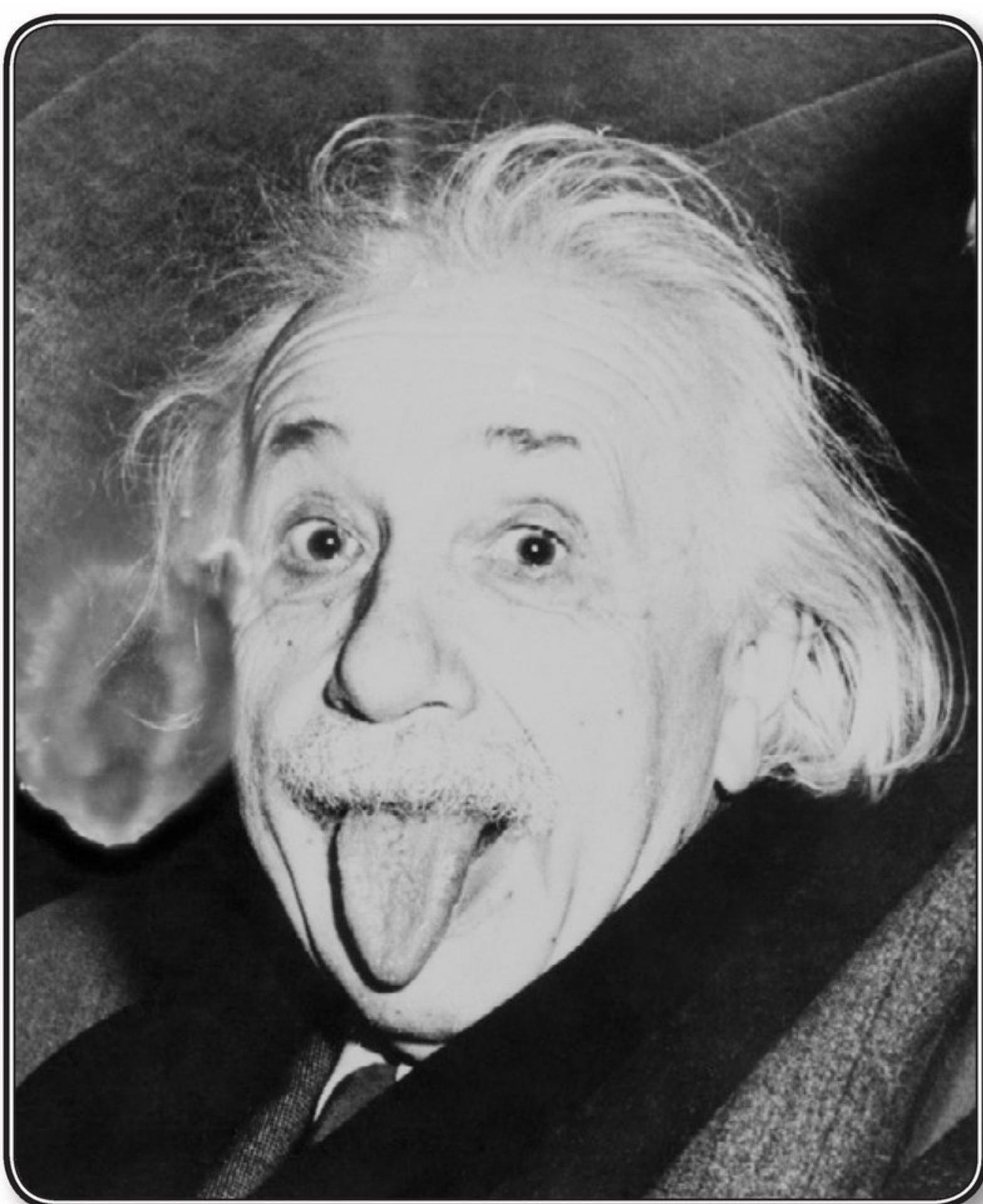
Albert Einstein



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Written by Michael Emerson

Albert Einstein



Written by Michael Emerson

Table of Contents

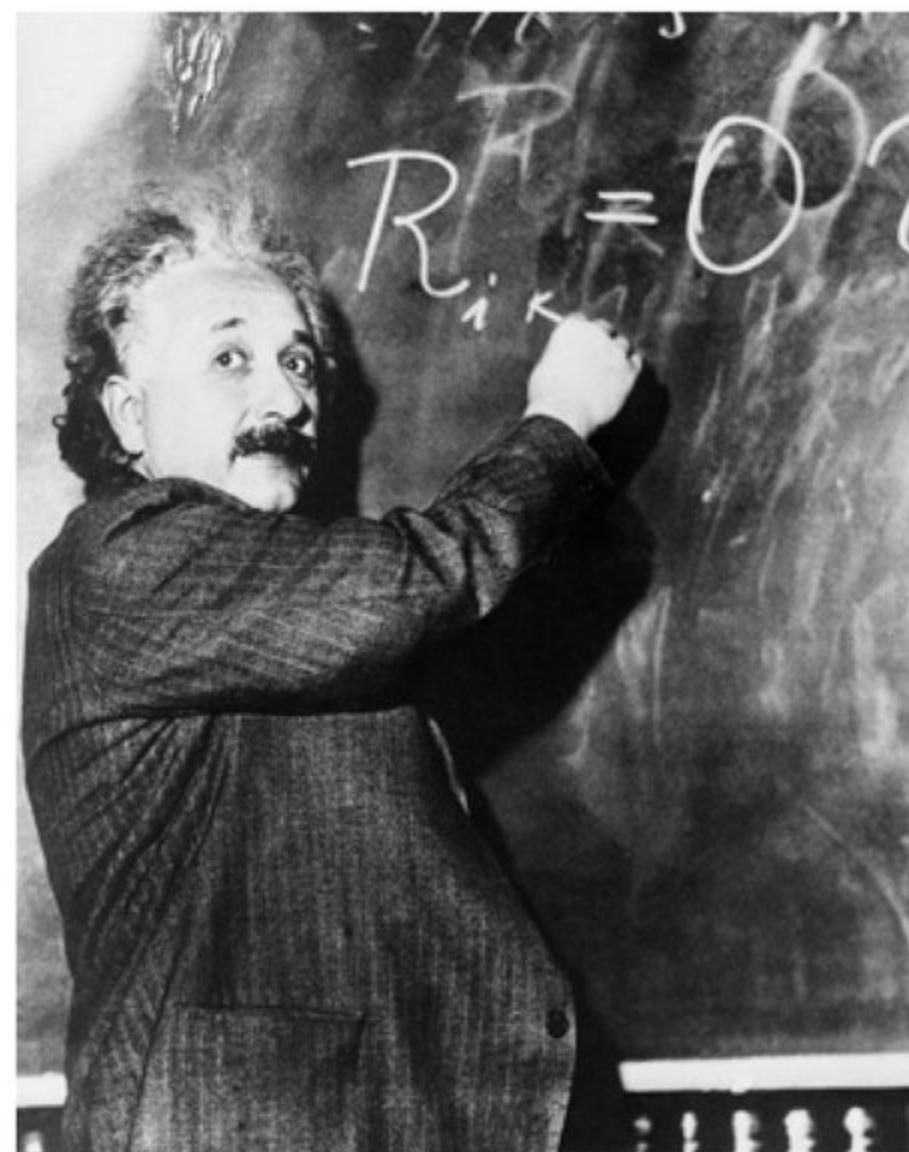
Deeply Hidden Things.....	4
A Talented, Curious Boy	5
The Patent Office.....	8
The Miracle Year.....	10
A Rising Star	12
The Uses of Fame	15
Coming to America.....	17
Einstein's Influence.....	20
A Life Well Lived.....	22
Glossary	23
Index	24

Deeply Hidden Things

When Albert Einstein was five years old, his father, Hermann, showed him a magnetic compass. Watching its floating movement aroused his curiosity. What caused it to behave the way it did? Why did the compass's needle stay almost still while his father turned the casing around and around in his hand? Why did the needle always point north, as though an invisible hand controlled it?

Einstein was too young to understand the answers, but he never forgot the 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 we 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, where Albert's younger sister, Maja, was born. Maja would become his closest childhood friend.

Einstein's entire family had a strong influence on his life. His mother, Pauline, played the piano, and she shared her love of music with her son. When Albert was six, she encouraged him to take up the violin, and although he disliked the required structure of his lessons, he found that he loved playing the instrument. His violin would be a constant companion for the rest of his life.



Albert Einstein with his sister, Maja

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 were correct. He eventually grew out of this peculiar habit and became an accomplished public speaker.

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, a medical student who came to dinner once a week, brought him science, math, and philosophy books, and Einstein would **pore** over the books for hours at a time. He was especially enthralled with a book about geometry, although the books about philosophy also helped to shape the scientist—and the person—he would become. Even as a child, Einstein had the ability to concentrate deeply, and he would pursue complicated problems until he was satisfied that he had considered every solution.

In school, Einstein's talent for math and science was apparent immediately; however, so was his individuality. To young Einstein, the teachers seemed like army sergeants who only drilled their students to memorize useless information and lifeless facts instead of encouraging them to think independently and seek new answers. Einstein preferred his own brand of creative thinking. His objections in class caused disruption. Eventually, one of his teachers suggested that he leave the school altogether because his attitude was diminishing the class's respect for the teacher.

Both Einstein and his teachers were relieved when he finally left this school at 15, to join his parents in Italy. The family had moved there to start a new business, but shortly after they settled in Italy, Einstein moved again, this time to finish school in Switzerland.

When he was only 17 years old, Einstein was accepted at one of the finest scientific universities in Europe. 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 learn to follow established rules.

The Patent Office

Einstein had trouble finding a job after finishing school in 1900. Certainly, he had been an unquestionably bright student, and 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 very teachers who could have helped him find the work he desired. A teaching position would have given him the freedom to pursue further study. Dismayed, but not discouraged, Einstein didn't 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 both the time and place in 1902, when he took a job as a clerk in a **patent** office, in Bern, Switzerland. His unusual job was to make sure that devices submitted for patent certification worked the way their inventors claimed 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.

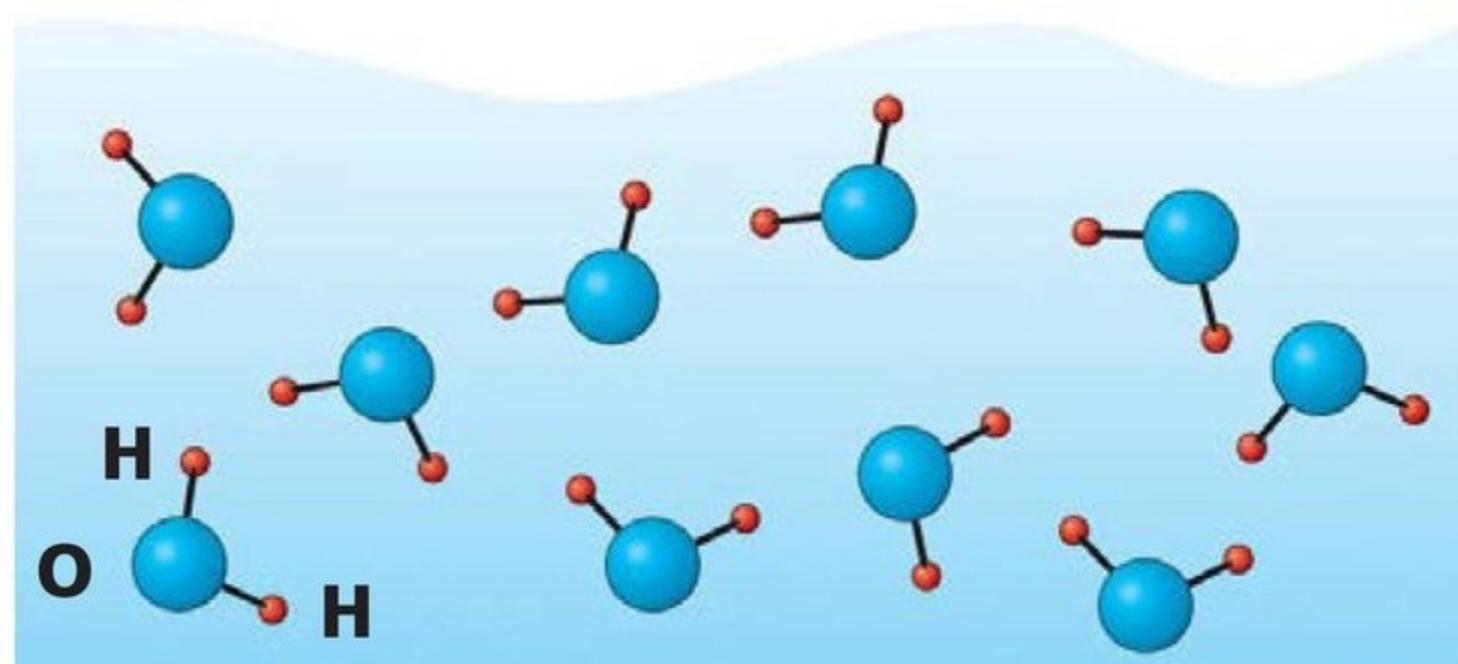


The security of a reliable salary and regular working hours gave Einstein the freedom to work on his own ideas. In his spare time, he met with a group of friends who shared his curiosity about the scientific ideas of the day as well as about developments in philosophy and mathematics. They called themselves the Olympia Academy, and their enthusiastic exchanges often went on until late in the evening, as they talked and socialized 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, and during that time, his thriving curiosity had led him to research, study, and give a great deal of thought to new scientific theories. He soon felt confident enough in his results to share the ideas that he had developed.

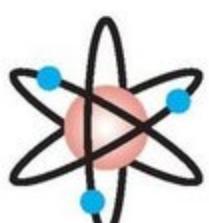
Einstein sent papers explaining his ideas to the leading German scientific journal of the time, *Annalen der Physik*. The journal published the first of these papers in March 1905, and four additional papers soon followed. Einstein's first paper explained his ideas about the nature and behavior of light.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



Water molecules (H_2O)

Scientists were astounded by what they read in his paper. Where had these unique ideas come from? But some were also angered, as they found their life's work suddenly diminished. In a mere six months, Einstein changed over two hundred years of accepted scientific thought about the content and behavior of the known universe. The scientific community was 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.

Immediately after the publication of his ideas, Einstein's scientific career took off in many directions. He was further energized by the attention his work received from the scientific community and by the opportunities that were open to him. He received invitations to speak at scientific meetings and to explain his new ideas. The 1905 Nobel Prize winner in physics personally congratulated Einstein. A well-known and highly respected 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."



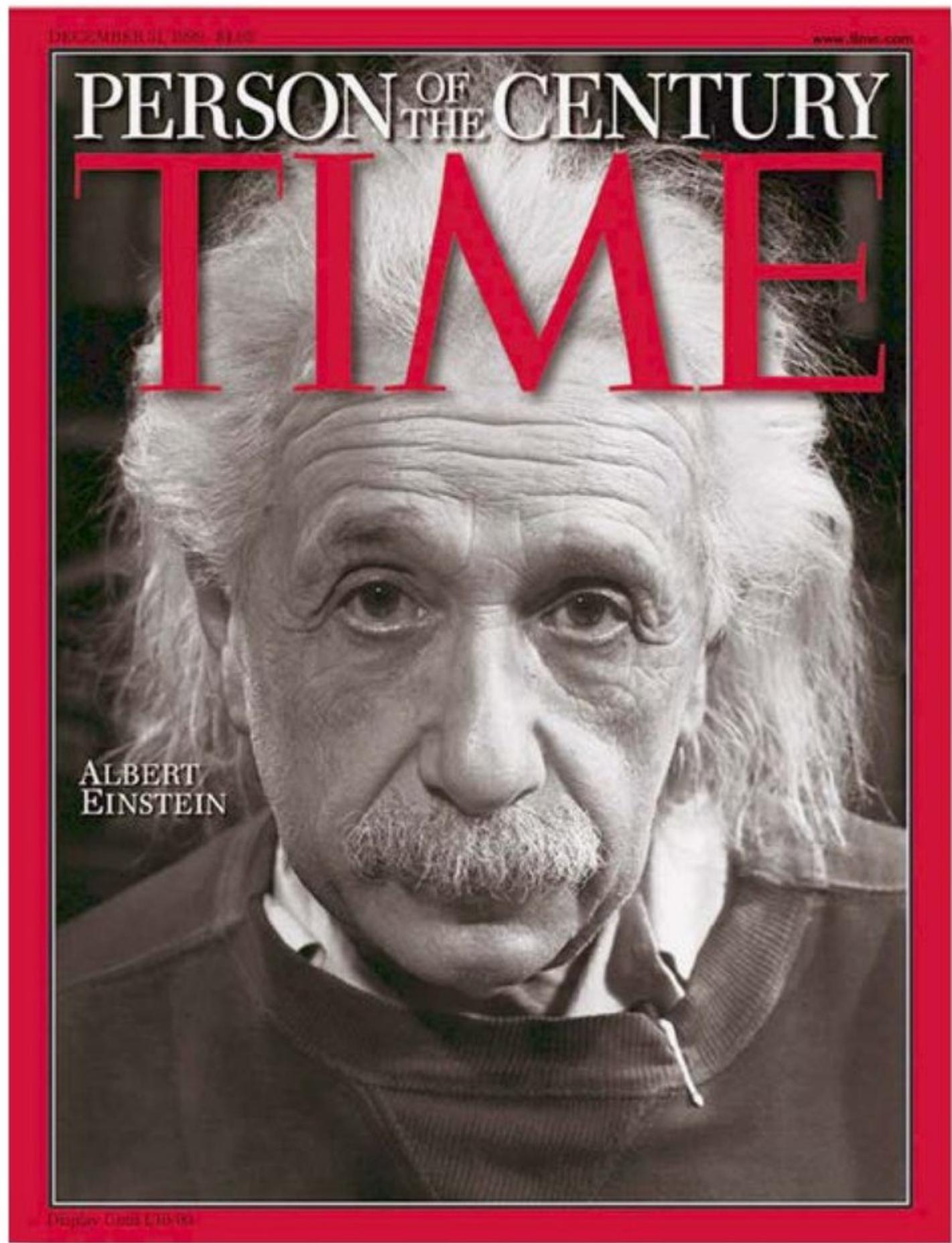
"The most incomprehensible thing about the world is that it is comprehensible."

A Rising Star

Einstein continued to work at the patent office until 1909. That year, he was gratified to finally receive an offer for a full-time job at a university. Einstein accepted the position but then characteristically jumped from school to school for the next few years, still searching for the ideal place to pursue his research.

Meanwhile, he continued to develop and refine his earlier ideas in new ways, which was hard work, and several times Einstein thought he was on the wrong track. He could be highly self-critical. In fact, his ideas were so new and unfamiliar that he said they almost drove him insane. Then, in 1915, he had a breakthrough—he finally determined how to unite his earlier individual ideas into one system, which he called the General Theory of Relativity.

Einstein's ideas once again excited scientists around the world. In 1919, British scientists tested Einstein's theory by measuring the position of a star during a solar eclipse. If Einstein was correct, the star would appear to be in one position while it was actually in another. To the astonishment of many, the star appeared almost exactly where Einstein said it would be!

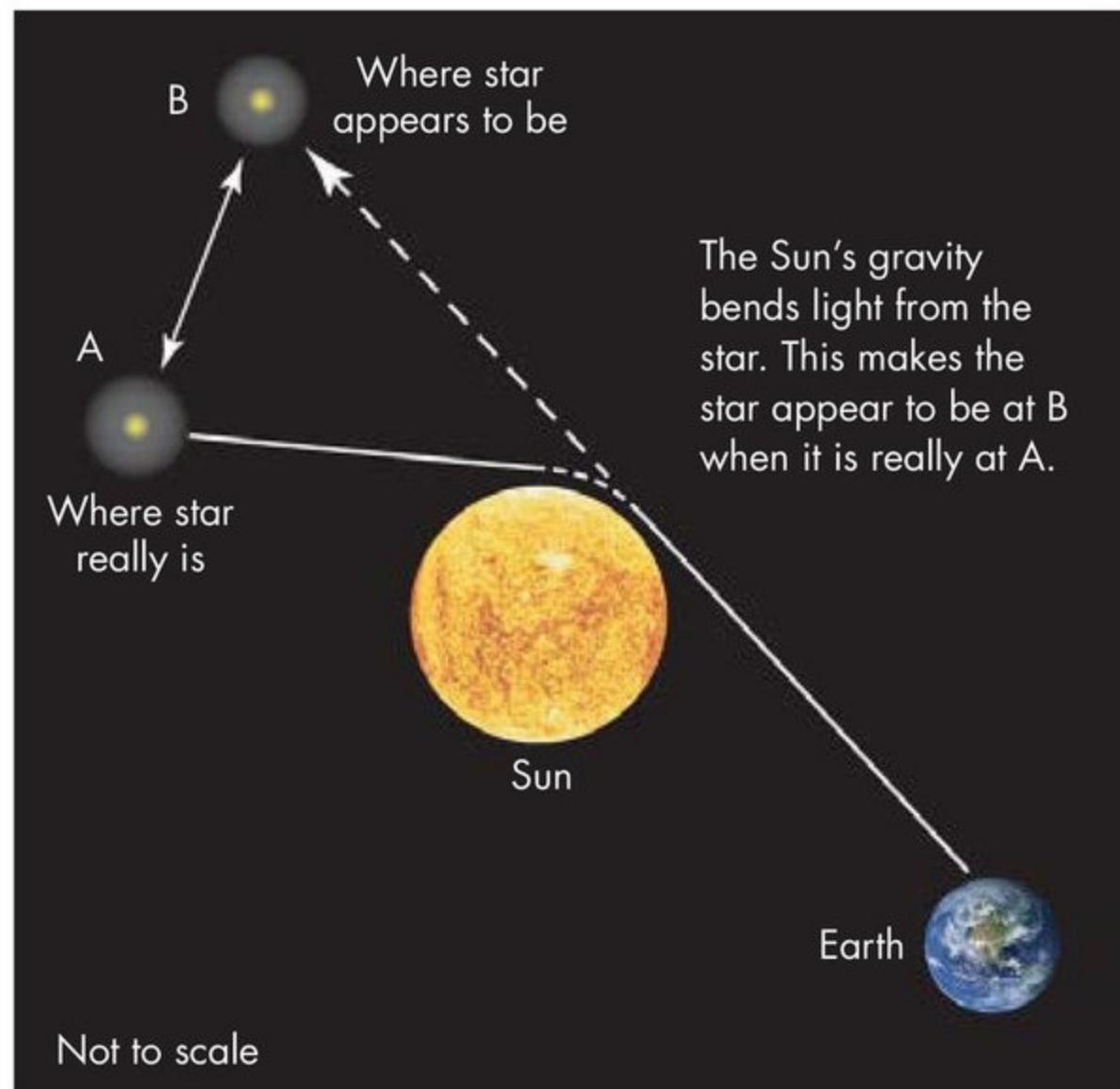


Newspaper headlines around the world announced the findings. A British newspaper declared, “**Revolution** in Science—New Theory of the Universe.” A German newspaper called Einstein a “new celebrity in world history” and said that his ideas were “a complete revolution in our concepts of nature.” Overnight, Albert Einstein became one of the most famous people in the world. Some would eventually proclaim, with good reason, that he was the most **influential** person of the twentieth century.

Despite his success and the wide acceptance of his theories, not everyone was pleased with Einstein.

Many scientists had built their careers on ideas that Einstein

tossed aside, and others did not want to believe Einstein's theories because they would be difficult to test in a laboratory. Some people simply disliked Einstein because he was a Jewish man living in a country where prejudice against many groups of people was growing. Over the next few years, Einstein's friends increasingly feared for his safety.

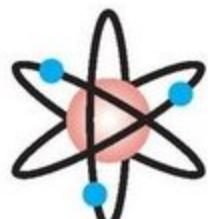


Although Einstein would become a vocal opponent of the rising prejudice in Germany, he took the professional criticism of his work in stride. He knew that his theories were not perfect, yet with each new paper published, more and more people came to believe Einstein's work was critically important. In 1922, Einstein was awarded the **prestigious** Nobel Prize in physics.



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 writings. Einstein had mixed feelings about all this attention. These demands on his time interrupted his research, and he realized that many people would continue to misunderstand his ideas no matter how carefully he explained them.

Despite his concerns, Einstein also knew that fame could open the minds of more people and allow him to bring his ideas to wider audiences. The more speeches and interviews he gave, the more people would hear about his theories 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 speaking out against German militarism and against the country taking part in World War I. More than 100 scientists had signed a letter supporting Germany's entry into the war. Now that he had gained the world's attention through his scientific work, he increased his participation in antiwar efforts, publicly supporting international groups working for peace. He wrote often about his antiwar beliefs. When Germany began preparing for war again in the 1920s and 1930s, Einstein continued to write and speak out.

Einstein also believed strongly in creating a new Jewish country, to be called Israel, in the Middle East. He **advocated** a world government over **nationalism**, but after witnessing the rising violence and hatred against Jews in his homeland, he felt that Jewish people should unite in any way possible. Beginning in 1921, he became more visible in his support of the Jewish cause. In 1952 he was offered the presidency of the new country of Israel, which he respectfully declined.

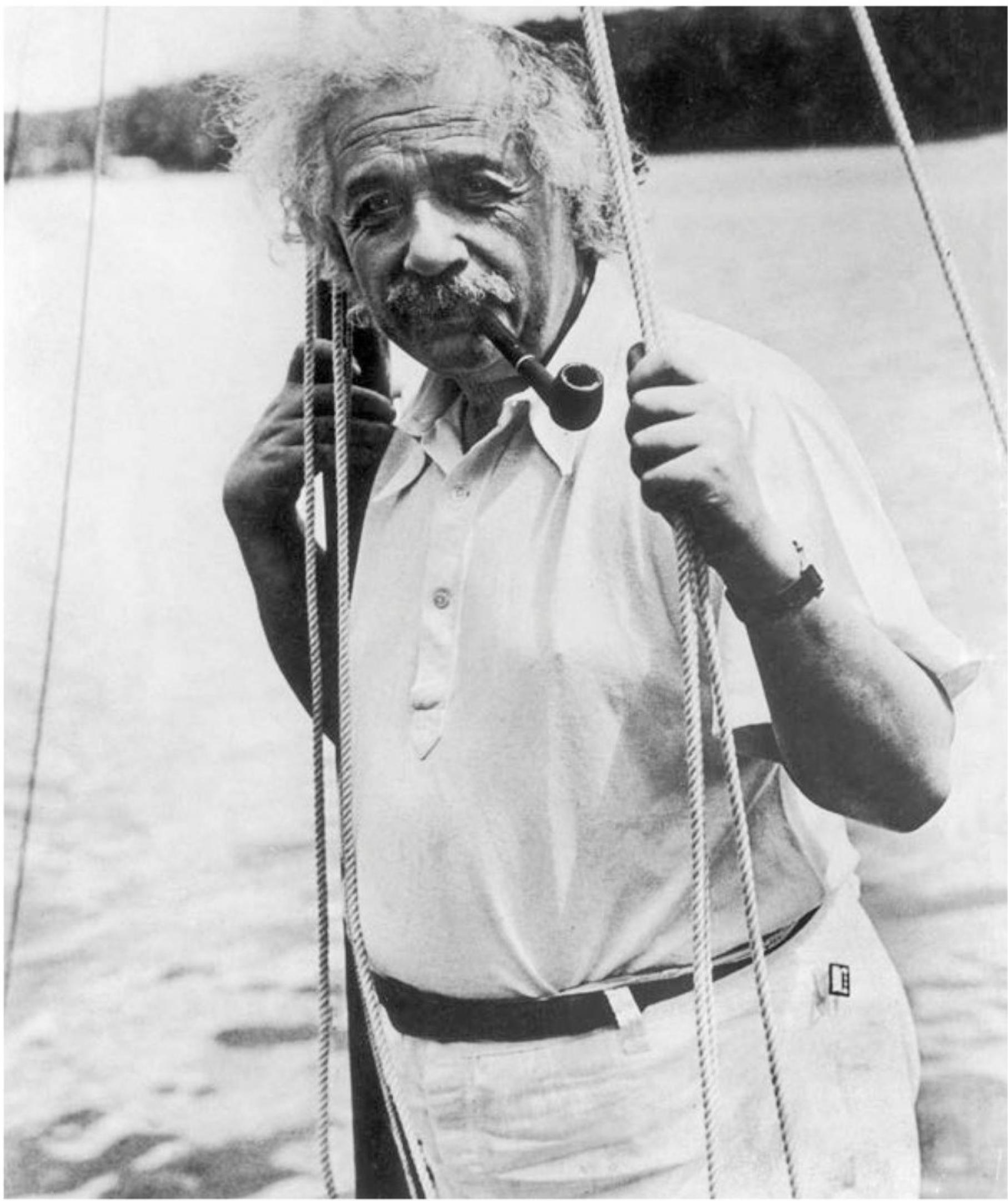
Coming to America

Despite the efforts of Einstein and others to promote peace, Germany moved closer to war in the 1930s. Until this time the German government had tolerated Einstein, his fame, and his criticism of their plans, but Einstein knew this tolerance would not last. In 1933, following a series of annual lectures in the United States, he sailed to Belgium to formally give up his German citizenship. Without returning to his home in Germany, Einstein accepted a position with the Institute for Advanced Study at Princeton University in the United States. In reaction, German military troops seized much of his property, publicly burned many of his papers and books, and denounced him as a traitor.

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



112



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

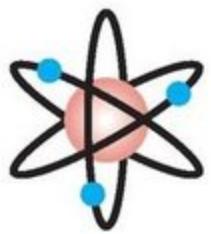
At Princeton, Einstein moved his family into a house close to his office. They soon became part of Princeton's close-knit community. When out-of-town visitors wanted to know where the great man lived, townspeople would ask, "Are you expected?" This question prevented strangers from bothering Einstein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

For the next 22 years, Einstein continued working to expand his ideas into new areas. Some people thought that his efforts showed that he was losing touch, but Einstein didn't pay much attention to this criticism. He believed that he could develop a new theory that would unify his ideas with the latest theories. He remained dedicated to his work and his 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



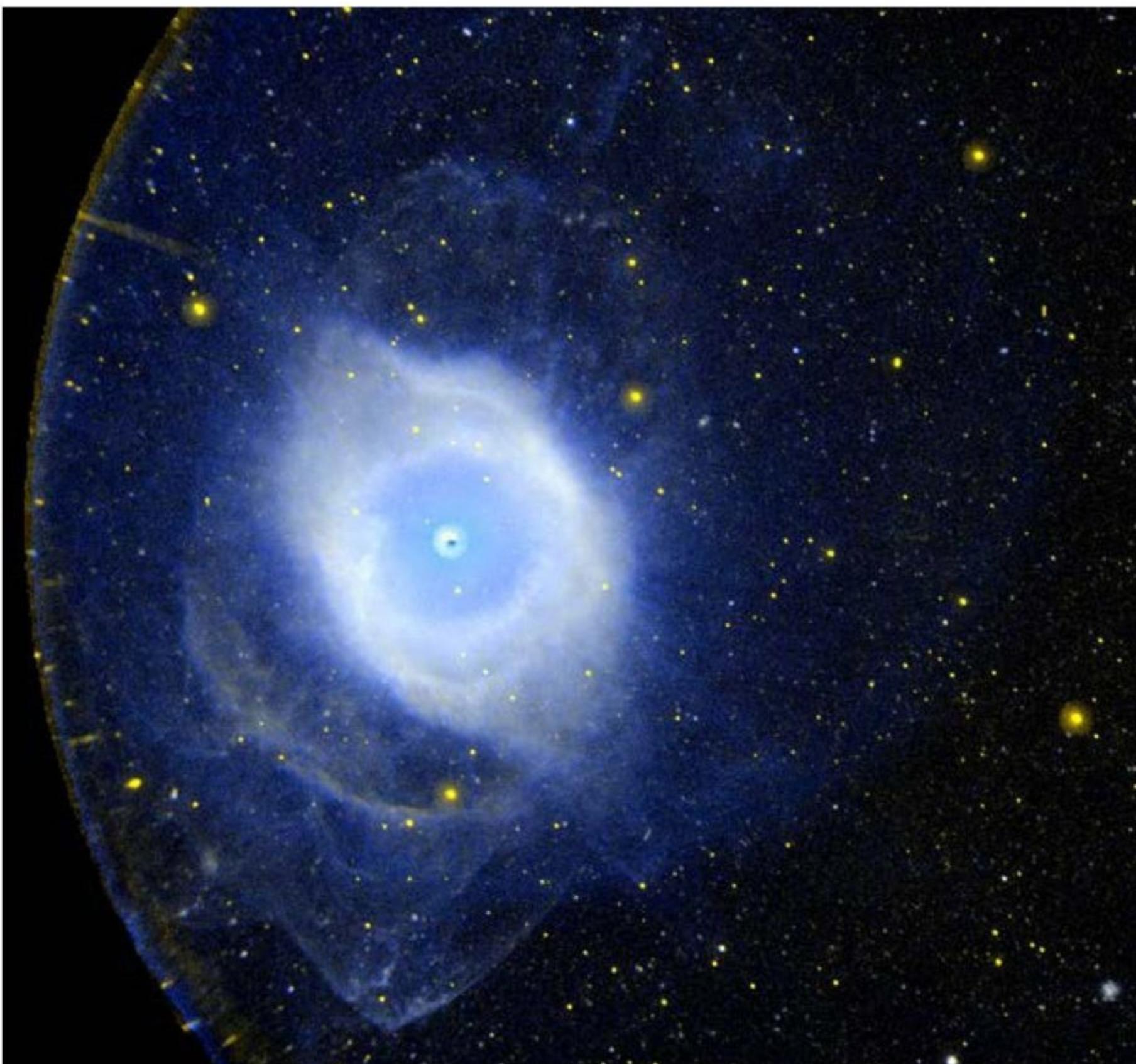
"Few are those who see with their own eyes and feel with their own hearts."

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, and these new technologies eventually led to the production of television cameras, remote controls for home electronics, and flat-screen computers. Einstein was also the first person to think of laser light, a technology that is now used in compact discs (CDs), digital video discs (DVDs), and supermarket checkout equipment.



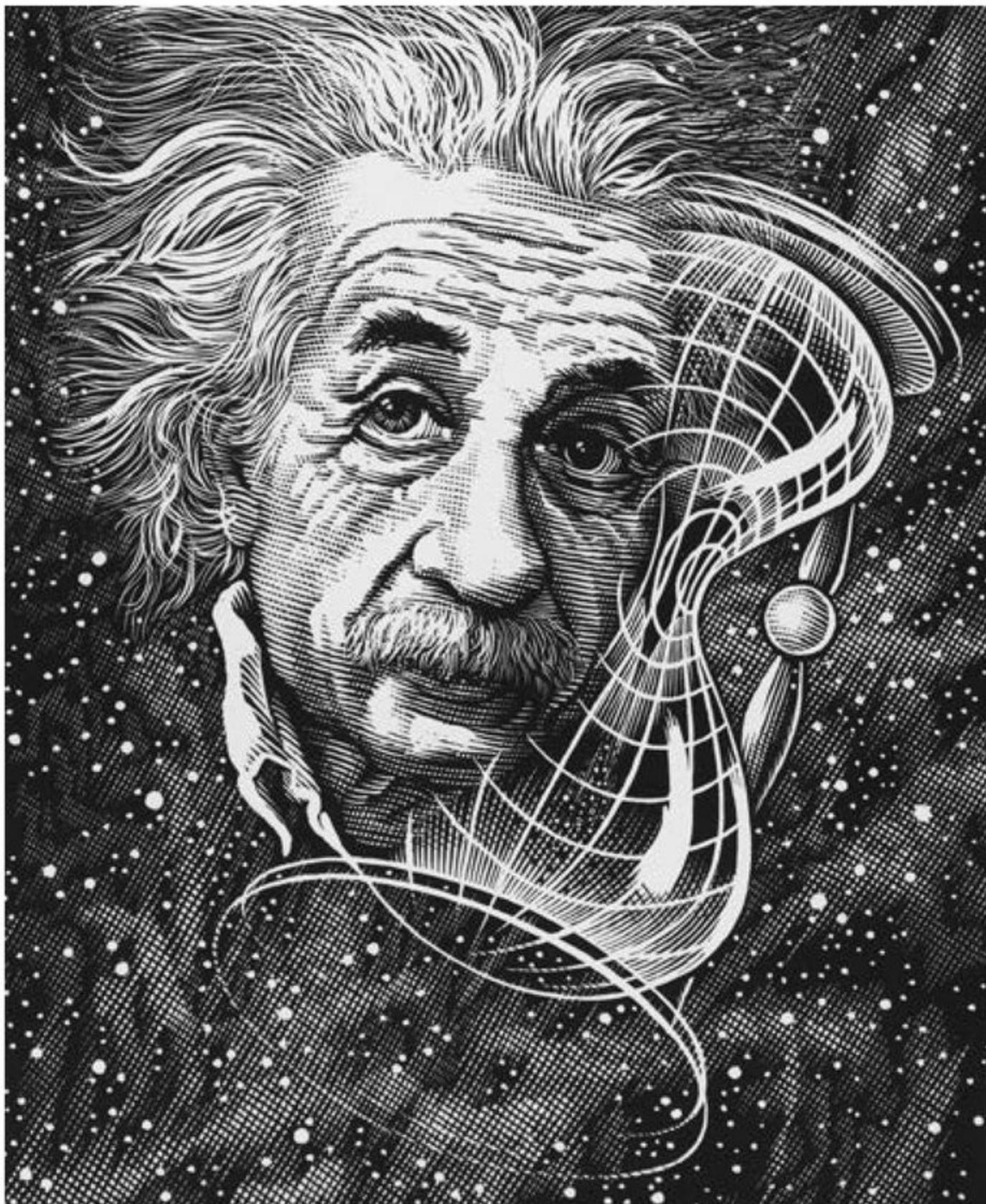
His proof of the existence of atoms and molecules led to the creation or improvement of a wide range of products, including shaving cream, toothpaste, personal computers and cell phones.





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 and technologies. Current ideas about the origins of the universe, the nature of space and time, and strange, intriguing objects called black holes all owe a large debt to Einstein's work and original thinking. Einstein's discoveries and equations provided the foundation for scientists to comprehend many aspects of the universe. Scientists have only recently been able to test and confirm some of Einstein's most interesting theories.



A Life Well Lived



“The important thing is to never stop questioning.”

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

advocated (<i>v.</i>)	supported or recommended (p. 16)
algebra (<i>n.</i>)	a branch of math in which symbols, usually letters, are used to represent unknown numbers (p. 6)
atoms (<i>n.</i>)	tiny pieces of matter (p. 10)
compass (<i>n.</i>)	a direction-finding tool with a needle that always points north (p. 4)
influential (<i>adj.</i>)	having the power to shape events (p. 13)
molecules (<i>n.</i>)	the smallest parts of a substance that are still identifiable as that substance (p. 10)
nationalism (<i>n.</i>)	the belief in the success and independence of one's own nation (p. 16)
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)
prestigious (<i>adj.</i>)	having honor, respect, or high standing (p. 14)
revolution (<i>n.</i>)	an overthrow of previous ideas or ways of doing things (p. 13)

Index

- beliefs, 16
black holes, 21
born, 5
compass, 4
criticism, 14, 17, 19
curious, 4, 5
curiosity, 7–10, 20, 22
fame, 15–17
family, 5–7, 18
father, 4, 6
General Theory
of Relativity, 12, 19
inventor, 8, 20
Israel, 16
job, 8, 12
journal, 10
laboratory, 7, 14
laser light, 20
magnetic, 4
miracle year, 10, 11, 19
mother, 5
mysterious, 22
Nobel Prize, 11, 14
Olympia Academy, 9
papers, 10, 11, 17
patent office, 8, 10, 12
patents, 8, 10–12
peace, 16, 17
philosophy, 6, 9
Princeton University, 17, 18
public speaker, 6, 17
research, 10, 12, 15
revolution, 13
school, 7, 8, 12
scientific theories, 10
scientist(s), 4, 6, 11, 12, 14,
16, 19–21
sister, 5
solar eclipse, 12
uncles, 6
United States, 17
universe, 4, 11, 13, 21, 22
violin, 5
war, 16, 17
work, 7–9, 11, 12, 14, 16,
19, 21, 22

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

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