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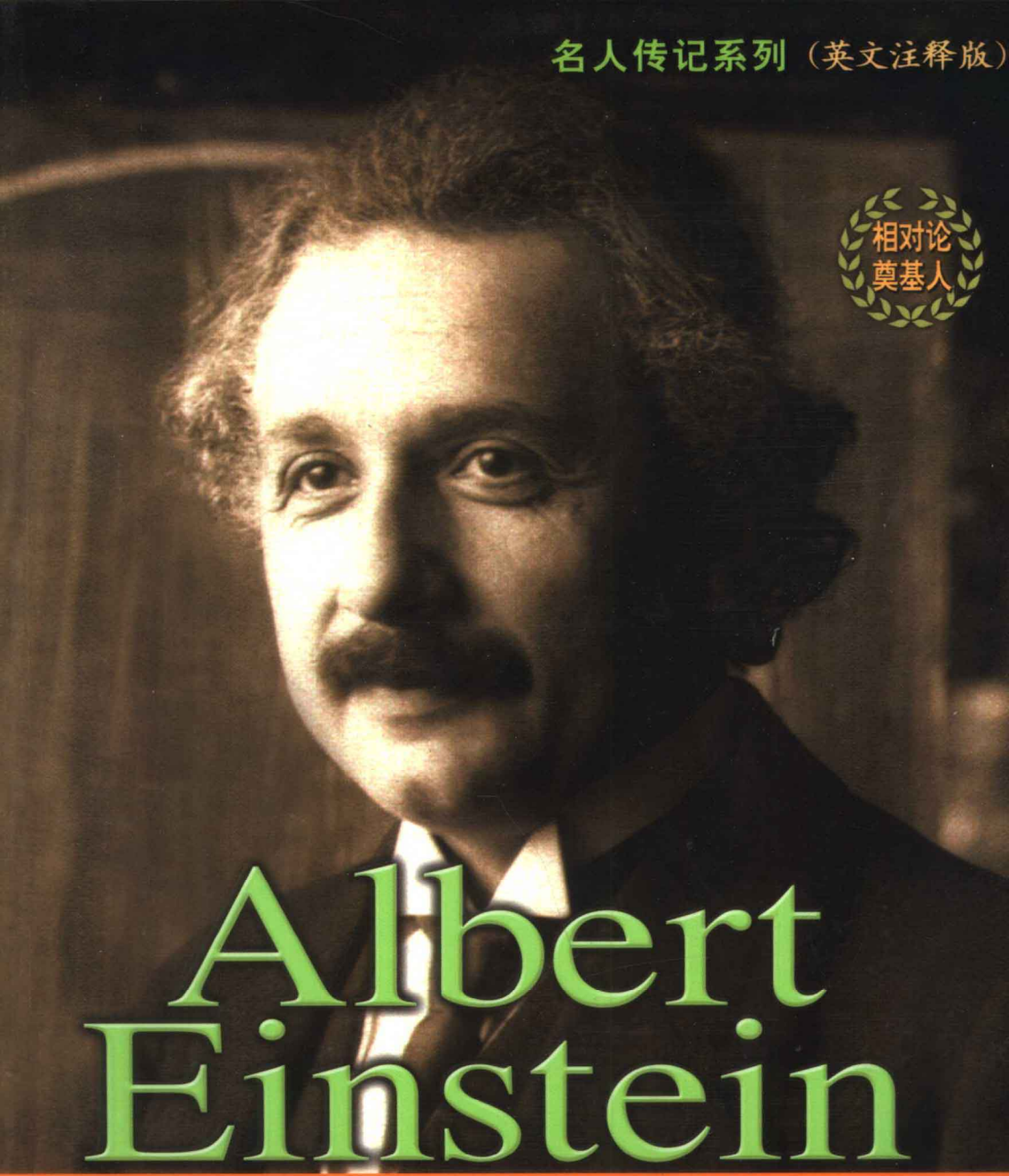

相对论
奠基人

# Albert Einstein

## A BIOGRAPHY

# 爱因斯坦传

[美] 艾丽斯·卡拉普斯
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# SERIES FOREWORD

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While the emphasis is on fact, not glorification, the books are meant to be fun to read. Each volume provides in-depth information about the subject's life from birth through childhood, the teen years, and adulthood. A thorough account relates family background and education, traces

personal and professional influences, and explores struggles, accomplishments, and contributions. A timeline highlights the most significant life events against a historical perspective. Bibliographies supplement the reference value of each volume.

# PROLOGUE: WHY EINSTEIN?

Pop idols, like fads, are here today and gone tomorrow. They are intensely popular for a relatively short time, have a short-term impact or influence on us—not always a positive one—and soon enough are forgotten and replaced by someone else. Once or twice in a century, perhaps, someone comes along in a special area of expertise who also has enduring qualities: such a person challenges our accepted ways of thinking, makes enormous and far-reaching contributions, and helps to revolutionize our world in a positive way. Almost everyone in the literate world recognizes the name and face of such a person. In modern times, one of these people was Albert Einstein, a binary star of superscientist and humanitarian and *Time* magazine's "Person of the Twentieth Century." This honor went to Einstein not to glorify him but to remind us of what he represented as a symbol of both human capabilities and frailties. Until Einstein, no one had challenged the accepted wisdom about the physical world so profoundly since Isaac Newton. Among other things, Einstein gave us new insights into the properties of space and time, showed that nothing can travel faster than the speed of light, predicted that time travel into the future is both mathematically and physically possible, and passionately, if perhaps sometimes naively, worked for world peace. For many, he is the standard of greatness.

Why does Einstein hold such fascination for us? What has made him such a captivating person for one hundred years, since the time he advanced his special theory of relativity in 1905 during his *annus mirabilis*, his "Year of Miracles"? Surely, his genius has something to do with his appeal; after all, he saw relationships in the physical world to which

other people had been blind. But what made Einstein remarkable was not only his famous brain and his discoveries but many other characteristics as well: his charisma, humanity, modesty, wry sense of humor, courage to speak his mind even when his life was in danger; his love of children, music, and animals; and his resilience during hard times. We also know him for his well-known idiosyncrasies: the twinkle in his eyes, the shock of unruly hair, his dislike of socks, and his love of ice cream cones. Even though Einstein was not a perfect or consistent person, especially as a husband and father, and his idea of humor, often tongue in cheek, sometimes appears mean spirited, his frailties do not detract from his overall contributions to the world, and they punctuate his humanness. All these characteristics have made Einstein, despite his faults, a charismatic human being of tremendous intellect, wisdom, and depth.

To be a good scientist or mathematician, one does not have to be a genius. As Einstein said, one need only be very curious about the world. He was passionately devoted to his science, often to the exclusion of matters that are important in most people's lives. This behavior is not so strange, however: many talented people are obsessed with their gift, whether it is in science or sports—or even with a hobby. Einstein was more intensely preoccupied with his work in the first half of his life than later on, when he was past his prime in doing original work in physics. During his later years, he spent more time promoting the political, social, and educational causes he championed.

In this book, we present Einstein from birth to death and reflect on all the wonderful and terrible things that happened to him in between while he lived his life on two continents. Chapters 4, 7, and 12 explain his physics, and the remaining chapters cover the other important events in his life during the turbulent but interesting times through which he lived. Einstein will emerge not only as a great scientist but also as a humanitarian who was passionately concerned about the welfare of his fellow human beings and the security of the world. He respected people of all occupations, of all races, and of all ages. His advice was always to do the best one can no matter what one chooses to do in life; above all, he said, we have an obligation to do what is best for our community.

Albert Einstein could have rested on his laurels after relativity theory and, later, the Nobel Prize made him internationally famous, but he chose not to. He had more to do.

* * *

We would like to thank the following people for their input and support: AC is grateful to a British friend who read the first draft and tried

telling her how they write and punctuate English over there; TL tried telling her again, but her many years of consorting with the *Chicago Manual of Style* and Follett's *Modern American Usage* left her unconvinced. Both of us thank Kevin Downing, our editor and old friend at Greenwood, for presenting us with the challenge of writing this book; and we thank the remaining colleagues, friends, and family members who egged us on by never failing to ask if we'd finished the book yet.

# TIMELINE

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| 1879 March 14 | Albert Einstein is born in Ulm, Germany, to Jewish parents, Hermann and Pauline Koch Einstein. |
| 1880 | The Einstein family moves to Munich. |
| 1881 | Einstein's sister, Maja, is born. |
| 1884 | Young Einstein is shown a compass by his father, which fascinates him, making him aware of forces that can't be seen. |
| 1885 | In the fall, Einstein begins his education at a Catholic neighborhood school, the only Jewish child in his class. He receives Jewish religious instruction at home and becomes curious about religion; he also begins violin lessons. |
| 1888 | As Einstein becomes nine years old, he enters the Luitpold-Gymnasium (secondary school) in Munich. |
| 1889 | At the age of 10, Einstein's interest in physics, mathematics, and philosophy begins when a young family friend who recognized Albert's intelligence and curiosity introduces him to these subjects through a number of popular scientific and technical books. In April, a baby named Adolf Hitler is quietly born in Austria. |
| 1890 | By this time, Albert is able to prove the Pythagorean theorem by himself, and he enjoys working out difficult problems and puzzles. |
| 1891 | Reading on his own, Albert teaches himself higher |

mathematics and calculus.

1892 Young Albert is becoming a good violinist and continues to read science books voraciously.

1894 Einstein's family moves to Italy; he stays in Munich to finish school but is unhappy and quits, joining his family at the end of the year. His teacher had told him that he would never amount to anything and that because of his irreverence, his presence undermined the whole class's respect for the teacher.

1895 Albert tries to enroll in the Swiss Federal Polytechnical School in Zurich two years early, but he fails the nonscientific part of the entrance exam and is urged to spend another year in secondary school.

1896 At the age of 17, Einstein relinquishes his German citizenship, with his father's consent, because he detests the country's obsession with regimentation in most aspects of life, and he remains stateless for the next five years. He enters the Swiss Federal Polytechnical Institute in October. He begins a relationship with Mileva Marić, a physics student from Serbia.

1899 Einstein applies for Swiss citizenship and spends his summer vacation with his mother and sister in Switzerland.

1900 Einstein is graduated from the Federal Polytechnical Institute and begins a job search in Europe. At the same time, he works on problems in theoretical physics that are of interest to him.

1901 Becomes a Swiss citizen. Seeks employment. His first scientific paper, "Conclusions Drawn from the Phenomena of Capillarity," is published in March in *Annalen der Physik*. In the summer, works as a substitute teacher at the technical school in Winterthur and in the fall as a tutor in a private boarding school in Schaffhausen. Stays in touch with and visits Mileva regularly. Begins work on a doctoral dissertation on molecular forces in gases that he submits to the University of Zurich in November. December, applies for a position at the Swiss Patent Office in Bern.

1902 Probably in January, daughter Lieserl is born out of wedlock to Mileva. Einstein withdraws his doctoral

dissertation from the University of Zurich. June, begins a provisional appointment as Technical Expert, Third Class, at the Patent Office in Bern. October, his father dies in Milan.

1903 January 6, marries Mileva in Bern, where they take up residence. September, daughter Lieserl is registered, which may have indicated intention to put her up for adoption in case knowledge of the illegitimacy would be a threat to Einstein's federal appointment. No mention is made of Lieserl after she contracts scarlet fever in September while Mileva is on a visit to Budapest. (Lieserl never lived with her parents, Einstein never saw his daughter, and all trace of her has been lost.) At this time, Mileva is pregnant again.

1904 May 14, son Hans Albert ("Adu") is born in Bern (died 1973 in Falmouth, Massachusetts; buried in Woods Hole, Massachusetts). September, Einstein's provisional appointment at the Patent Office becomes permanent.

1905 Einstein's "year of miracles" with respect to his scientific publications. April 30, submits his doctoral dissertation, "A New Determination of Molecular Dimensions," for publication. In addition, publishes three of his most important scientific papers: "On a Heuristic Point of View concerning the Production and Transformation of Light" (published June 9), which deals with the quantum hypothesis, showing that electromagnetic radiation interacts with matter as if the radiation has a granular structure (the so-called photoelectric effect); "On the Movement of Small Particles Suspended in Stationary Liquids Required by the Molecular-Kinetic Theory of Heat" (published July 18), his first paper on Brownian motion, leading to experiments validating the kinetic-molecular theory of heat; and "On the Electrodynamics of Moving Bodies" (published September 26), his first paper on the special theory of relativity and a landmark in the development of modern physics. A second, shorter paper on the special theory, published November 21, contains the relation $E = mc^2$

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| | in its original form. |
| 1906 | January 15, formally receives doctorate from the University of Zurich. March 10, promoted to Technical Expert, Second Class, at the Patent Office. |
| 1907 | While still at the Patent Office, seeks other employment, including at the cantonal school in Zurich and at the University of Bern. |
| 1908 | February, becomes a *Privatdozent* (lecturer) at the University of Bern. Sister Maja receives her doctorate in Romance languages from the University of Bern. |
| 1909 | May 7, is appointed Extraordinary Professor of Theoretical Physics at the University of Zurich, effective October 15. Resigns from his positions at the Swiss Patent Office and the University of Bern. Receives his first honorary doctorate, at age 30, from the University of Geneva. |
| 1910 | March, sister Maja marries Paul Winteler, son of Einstein's landlord in Aargau. July 28, second son, Eduard ("Tete"), is born (died 1965 in a psychiatric hospital in Burghölzli, Switzerland; he had had a history of schizophrenia since he was in his twenties). October, completes a paper on critical opalescence and the blue color of the sky, his last major work in classical statistical physics. |
| 1911 | Accepts an appointment as director of the Institute of Theoretical Physics at the German University of Prague, effective April 1, and resigns his position at the University of Zurich. Moves his family to Prague. October 29, attends the first Solvay Congress in Brussels. |
| 1912 | Becomes reacquainted with his divorced cousin Elsa Löwenthal and begins a romantic correspondence with her as his own marriage disintegrates. Accepts appointment as professor of theoretical physics at the Eidgenössische Technische Hochschule (ETH) in Zurich (formerly the Polytechnical Institute), beginning in October, and resigns his position in Prague. |
| 1913 | September, sons Hans Albert and Eduard are baptized as Orthodox Christians near Novi Sad, Hungary (later Yugoslavia), their mother's hometown. |

November, is elected to the Prussian Academy of Sciences and is offered a position in Berlin, home of Elsa Löwenthal. The offer includes a research professorship at the University of Berlin, without teaching obligations, and the directorate of the soon-to-be-established Kaiser Wilhelm Institute of Physics. Resigns from the ETH.

1914 April, arrives in Berlin to assume his new position. Mileva and the children join him but soon return to Zurich because of Mileva's unhappiness in Berlin. August, World War I begins.

1915 Cosigns a "Manifesto to Europeans" upholding European culture, probably his first public political statement. November, completes his work on the logical structure of general relativity.

1916 Publishes "The Origins of the General Theory of Relativity" (later to become his first book) in *Annalen der Physik*. May, becomes president of the German Physical Society. Publishes three papers on quantum theory.

1917 February, writes his first paper on cosmology. Becomes ill and is weakened by a liver ailment and an ulcer. Elsa takes care of him. October 1, begins directorship of the Kaiser Wilhelm Institute of Physics. After World War I, holds dual Swiss and German citizenship.

1919 February 14, is divorced from Mileva. Divorce decree stipulates that the interest from any future Nobel Prize monies go to her and the children for living expenses and to ensure their permanent financial security. May 29, during a solar eclipse, Sir Arthur Eddington experimentally measures the bending of light and confirms Einstein's predictions; Einstein's fame as a public figure begins. June 2, marries Elsa, who has two unmarried daughters, Ilse (22 years old) and Margot (20 years old), living at home. Late in the year, becomes interested in Zionism through his friendship with Kurt Blumenfeld.

1920 February 20, mother dies in Berlin. Expressions of anti-Semitism and anti–relativity theory become

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| | noticeable among Germans, yet Einstein remains loyal to Germany. Becomes increasingly involved in nonscientific interests. |
| 1921 | April and May, makes first trip to the United States. Receives honorary degree and delivers four lectures on relativity theory at Princeton University as part of the Stafford Little Lectures, which Princeton University Press in the United States and Methuen and Company in Great Britain later publish as *The Meaning of Relativity*. Accompanies Chaim Weizmann on U.S. fund-raising tour on behalf of Hebrew University of Jerusalem. |
| 1922 | Completes his first paper on a unified field theory. October through December, takes trip to Japan, with other stops en route to the Far East. November, probably while en route to Shanghai, learns that he has won the 1921 Nobel Prize in physics. |
| 1923 | Visits Palestine and Spain. |
| 1924 | Stepdaughter Ilse marries Rudolf Kayser, a journalist and future Einstein biographer. Ilse had, for a time, considered marrying Einstein, who appears to have been in love with her, before he married her mother. |
| 1925 | Travels to South America. In solidarity with Gandhi, signs a manifesto against compulsory military service. Becomes an ardent pacifist. Receives Copley Medal. Until 1928, serves on board of governors of Hebrew University. |
| 1926 | Royal Astronomical Society of England awards him its gold medal. |
| 1927 | Son Hans Albert marries Frieda Knecht over his father's objections. |
| 1928 | Becomes ill again, this time with a heart problem. Is confined to bed for several months and remains weak for a year. April, Helen Dukas is hired as his secretary and remains with him as secretary and housekeeper for the rest of his life. |
| 1929 | Begins lifelong friendship with Queen Elisabeth of Belgium. June, receives Planck Medal. |
| 1930 | First grandchild, Bernhard, is born to Hans Albert and Frieda. Stepdaughter Margot marries Dmitri |

Marianoff (marriage later ends in divorce). Signs manifesto for world disarmament. December, visits New York and Cuba and stays (until March 1931) at the California Institute of Technology (Caltech) in Pasadena.

1931 Visits Oxford in May to deliver the Rhodes Lectures and receives honorary degree, then spends several months at his summer cottage in Caputh, southwest of Berlin. December, en route to Pasadena again.

1932 January through March, visits Caltech again. Returns to Berlin. Later, agrees to accept an appointment as professor at the Institute for Advanced Study in Princeton, New Jersey, at this point in the planning stages with no campus. December, makes another visit to the United States.

1933 January, Nazis come to power in Germany. Resigns membership in the Prussian Academy of Sciences, gives up German citizenship (remains a Swiss citizen), and does not return to Germany. Instead, from the United States, goes to Belgium with Elsa and sets up temporary residence at Coq sur Mer. Ilse, Margot, Helen Dukas, and Walther Mayer, an assistant, join them, and security guards are assigned to protect them. Takes trips to Oxford, where he delivers the Herbert Spencer Lecture in June, and Switzerland, where he makes his final visit to son Eduard. Rudolf Kayser, Ilse's husband, manages to have Einstein's papers in Berlin sent to France and eventually brought to the United States. Early October, leaves Europe, together with Elsa, Helen Dukas, and Walther Mayer, and arrives in New York on October 17 on the *Westmoreland;* Ilse and Margot and their husbands remain in Europe. Publishes, with Sigmund Freud, *Why War?* Begins professorship at the Institute for Advanced Study, temporarily located in the old Fine Hall (now Jones Hall) on the Princeton University campus.

1934 July 10, Ilse dies in Paris at age 37 after a long and painful illness. Margot and Dmitri come to Princeton. Rudolf remains in Europe.

1935 Fall, moves to 112 Mercer Street, Princeton, where

Einstein, Elsa, Margot, Maja, and Helen Dukas will live out their lives. Receives Franklin Medal.

1936 Hans Albert receives doctorate in technical sciences from the ETH in Zurich (in 1947 he becomes a professor of hydraulic engineering at the University of California at Berkeley). December 20, Elsa dies after a long battle with heart and kidney disease.

1939 Sister, Maja Winteler-Einstein, comes to live at Mercer Street. August 2, signs famous letter to President Roosevelt on the military implications of atomic energy. World War II begins in Europe.

1940 Receives U.S. citizenship. Maintains dual U.S. and Swiss citizenship until his death. Citizenship had been proposed earlier by an act of Congress, but Einstein preferred waiting to be naturalized the customary way.

1941 December, United States enters World War II.

1943 Becomes consultant to U.S. Navy Bureau of Ordnance, Section on Explosives and Ammunition.

1944 A newly handwritten copy of the original 1905 paper on the special theory of relativity is auctioned for $6 million as a contribution to the war effort.

1945 World War II ends. Retires officially from the faculty of the Institute for Advanced Study, receives a pension, but continues to keep an office there until his death.

1946 Maja suffers a stroke and is confined to bed. Einstein becomes chairman of the Emergency Committee of Atomic Scientists. Urges United Nations to form a world government, declaring that it is the only way to maintain world peace.

1948 August 4, Mileva dies in Zurich. December, Einstein's doctors tell him that he has a large aneurysm (abnormal dilatation) of the abdominal aorta.

1950 March 18, signs his last will, naming his friend Otto Nathan as executor and Otto Nathan and Helen Dukas as trustees of his estate. His literary estate (the archive) is to be transferred to the Hebrew University of Jerusalem after the death of Nathan and Dukas. (Arrangements are later made for an earlier transfer.)

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| 1951 | June, Maja dies in Princeton. |
| 1952 | Is offered the presidency of Israel, which he declines. |
| 1954 | Develops hemolytic anemia. |
| 1955 | April 11, writes last signed letter, to Bertrand Russell, agreeing to sign a joint manifesto urging all nations to renounce nuclear weapons. April 13, aneurysm ruptures. April 15, enters Princeton Hospital. April 18, Albert Einstein dies at 1:15 A.M. of a ruptured arteriosclerotic aneurysm of the abdominal aorta, caused by hardening of the arteries. He had opposed surgery to prolong his life. |

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Photo essay follows page 64.