Einstein

for Anyone: A Quick Read

Second Revised Edition

David R. Topper

Vernon Series on the History of Science

VERNON PRESS

www.vernonpress.com

In the Americas:
Vernon Press
1000 N West Street,
Suite 1200, Wilmington,
Delaware 19801
United States

In the rest of the world:
Vernon Press
C/Sancti Espiritu 17,
Malaga, 29006
Spain

Vernon Series on the History of Science

Library of Congress Control Number: 2016914467

ISBN: 978-1-62273-199-2

for Alexis

Alexis loves gravity:
Perched in chair on high,
She laughs gleefully,
Droppin' all that's nigh.

Table of Contents

List of Figures

Photos and Credits

PAGES MISSING

FROM THIS FREE SAMPLE

III. Race

In my last years of teaching, when I talked about Einstein in my classes, I was surprised how often a student would approach with the remark: "I didn't know that Einstein was Jewish." I was tempted to retort (but I did not): "And the Pope is Catholic." What I learned from the students' remark is that things some of us now take for granted are not so in the younger generation. All the more reason to write this book, I suppose. Moreover, this snooty remark by me (even if I did not say it) would be off-the-mark, anyway.

For the historian, Einstein's Jewish identity is a moving target. He waffled back and forth in his preteen years, and he didn't settle into a relatively stable identity until he was into his 40s. There is also some debate among those writing on this topic as to his allegiance to Judaism at different times in his life.

As to the title of this chapter: just as the word "love" had a dual meaning in Chapter **II**, so the word "race" has more than one connotation. Einstein's changing attitude toward Judaism, his so-called race, was often correlated to his exposure to anti-Semitism in Germany; later, after his move to the USA, he encountered (and was distress by) the discrimination against African-Americans – another form of racism.

As outlined in the previous chapters, Einstein's first real fling with Judaism was in those preteen years when he drove his parents batty trying to impose his orthodox views on the family. As reported in his autobiography, right before he was about to be Bar Mitzvah he abruptly abandoned this belief, as he immersed himself more and more into science and math. But this return to a secular worldview was not permanent. Although some historians question this, I believe (as reported before) that his short sojourn in Prague in 1911 was crucial for a reengagement with his

Jewishness. Here are some more details about that group of Jewish intellectuals.

First, they were diligently studying social and theological matters around Zionism and mysticism, with special interest in the ideas of the 17th century Jewish philosopher, Baruch Spinoza. On the topic of Zionism and mysticism, there is some debate as to how much this influenced Einstein.[44] It is true that he was not strongly attracted to Zionism until after his move back to Germany in 1914 and his exposure to the endemic anti-Semitism. Nonetheless, the seeds of Zionism were sown in Prague and, as will be seen, came to fruition in the 1920s; especially when he toured the USA with Chaim Weitzman of the World Zionist Organization in 1921, raising funds for the building of the Hebrew University of Jerusalem.

As for any attraction to mysticism, Einstein's scientific worldview precluded flirting with anything supernatural, psychic, or magical. In the 1920s, he referred to the vogue of various forms of spiritualism "as a symptom of confusion and weakness." Even psychoanalysis, which Sigmund Freud asserted was grounded on scientific principles, Einstein had serious misgiving about; indeed, he refused an offer to be psychoanalyzed, saying that he would rather remain the dark.[45] The Prague group's interest in mysticism probably meant they were reading medieval Jewish writings, such as the Zohar and Cabbala literature. In a letter, Einstein once referred the Prague group as "a small medieval-like band of unworldly people."[46] The medieval reference may be related to this literature, and as far as "unworldly" goes, it surely could apply to Einstein himself. I imagine he enjoyed the camaraderie of these marginal folks in an otherwise unpleasant Prague, despite not agreeing about all their reading materials.

If for no other reason than the group's focus on Spinoza, Einstein surely would have been drawn toward them, for he had read the 17th century Jewish philosopher's *Ethics* in the Olympia Academy days as reported by Solovine, and was fascinated by him.[47] Later in life, Einstein made it clear that Spinoza was his

favorite philosopher, and often quoted him when discussing theological matters. Over his life, Einstein was influenced by a range of philosophers in both his scientific work and his theological speculations. In the course of this intellectual journey, however, most were put aside, as he developed a more mature and nuanced view on such ideas. But Spinoza's star never dimmed.[48]

By the 1920s, when he was questioned about his religious beliefs, he invariably said he believed in Spinoza's God, "who reveals himself in the harmony of all that exists, but not in a God who concerns himself with the fate and actions of human beings."[49] Spinoza was excommunicated from his Jewish community in Holland for such ideas, which were, in part, seen as pantheistic; that is, the idea that God is identical to the universe. In traditional religion, God transcends (or lies beyond) all that is; therefore, pantheism was deemed as another form of atheism. (In contrast, atheists view pantheism as just another form of theism, or a belief in God.) That Spinoza was therefore an outcast surely was another factor in Einstein's attraction to him.

Accordingly, there were critiques leveled against Einstein by theists accusing him of being a pantheist. In one sense, he was not, for when he said that God "reveals himself," he seemed to imply a transcendent God. Here is how he put it: "I am not an atheist. I do not know if I can define myself as a pantheist. The problem is too vast for our limited minds." [50] Perhaps the simplest and most direct way he expressed his belief comes across in this story. In 1952, in his office in Princeton during a visit by a Jewish student from Yeshiva University, he was asked if he believed in God. Einstein's response began with a waving of his hand and pointing toward the window, which looked out onto a pastoral scene: "All that is not an accident," he said. [51] 'Nuff said?

The 1914 move back to Germany immersed Einstein into the social and intellectual life of Berlin. As seen in Chapter **II**, the idea of bringing him to Berlin was initiated by Walther Nernst, and he and Planck made the trip to meet Einstein in Zürich. What was not mentioned there was that the physical chemist, Fritz Haber, who

was Director of the Institute for Chemistry in Berlin, played a key role by meeting with the Minister of Education with the proposal to create the post for Einstein in Berlin. Haber had met Einstein in 1911 at a scientific conference and they struck up a friendship. Ten years older than Einstein, Haber was born Jewish but converted to Lutheranism at age twenty-four in order to fit into German society and evidently to avoid the obstacles in employment for most Jews. For him this move was also coupled with a strong sense of German patriotism that was common among Jews who felt they were part of the German nation.

Going back to the 19th century, such conversions were rare but not uncommon among German Jews, especially those whose talents were otherwise thwarted by latent anti-Semitism in society. The conversion, however, was not always a ticket to acceptance. As Haber, early in his career, once wrote to a colleague, "It is very difficult for me to get a chair anywhere. … Jews or baptized Jews are not wanted in the major positions."[52] Nonetheless, as Jews were gradually acculturated into some pockets of German intellectual and social life, they often felt they had more in common with their Christian acquaintances than with Orthodox Jews. This was especially true when there was an influx of Eastern European Jews from the Shtetls (Jewish ghettos) in the 1920s.

KWIK, and importantly, Einstein never even considered the option of conversion, despite his ambivalence with Judaism at different times in his life. The idea, I believe, would have been anathema to his attitude toward authority. He also abhorred many aspects of Germanic culture; the zealous militarism is an obvious one. But also the male rituals of dueling and excessive drinking. [53] Recall that in Aarau, Einstein the teetotaler was reading Kant while his fellow students were consuming beer. In an essay published in 1934 he spoke of a baptized Jew of present and past as a "pathetic creature." [54] Did he have his friend Haber in mind? There is no evidence that Haber ever discussed his conversion with Einstein. Haber, interestingly, despite his conversion, had almost exclusively Jewish friends. [55]

As a scientist, Haber went on to receive the Nobel Prize for Chemistry in 1918 for his synthesis of ammonia from nitrogen and hydrogen, a discovery that revolutionized the production of fertilizer, making high yields in agriculture throughout the world possible. The other application was to make explosives.

When the Einsteins moved to Berlin, they struck up a friendship with Haber and his wife, Clara, who had also converted. As Albert and Mileva's marriage unraveled, the Habers were in the middle, negotiating for both sides, and they continued mediating after Mileva moved back to Zürich. Then when the war broke out, despite their friendship, the fundamental differences between Einstein and Haber came to the fore. Einstein viewed the war enterprise as mass madness, and did not sign the patriotic document supporting Germany's invasion of Belgium. As seen in Chapter **II**, he signed instead a counter-manifesto, and began working with the pacifists. Haber, conversely, signed the official one, along with Planck, Nernst, and ninety other intellectuals.

With patriotic verve, Haber put his full-time effort into the war. Little did he know that as early as August 24, 1914 his friend Einstein wrote in a letter that "the best talent is being forced into this senseless butchery and henchman's service."[56] Haber eventually became the chief war scientist, directing work in explosives and was instrumental in the development of chlorine and other poisonous gases used in the war (think of mustard gas). His work in fertilizers displayed a benevolent side of science, but this chemical warfare exposed a malevolence goal – an endeavour that Haber's wife, Clara, could not live with. In 1915, she shot and killed herself with his pistol. This was the first family tragedy emanating from his work on poisonous gases. Later, as an even more egregious consequence, Haber's Institute went on to develop, as a pesticide, Zyklon B, which in the 1940s was used in the Nazi gas chambers to kill some of Haber's friends and relatives, along with millions of others.

World War I unleashed the latent anti-Semitism in German society when Germany lost the war. It came out of the shadows as

Socialists and Jews were blamed by right-wing Nationalists for Germany's defeat. No longer could many patriotic German Jews believe that anti-Semitism was a mere anomaly that would go away with more assimilation. Those who were never fully comfortable with the contradiction between their otherness and their overt patriotism often turned toward Zionism. [57] Einstein, as seen, was exposed to the Zionist ideal during his Prague sojourn; and so, in Berlin, he again befriended a group of Jewish intellectuals devoted to the cause of Zionism. During and especially after the war, Einstein's identification with Judaism grew as he increasingly referred to himself as being a member of "the tribe."

The growing and explicit racism in Germany was directed increasingly toward Einstein when he became famous following the Royal Society of London's experiment during the solar eclipse of 1919, initiated by Arthur S. Eddington, which proved, as Einstein had predicted, that light from a star is bent by the sun. A Jew getting so much attention and adulation grated on the bigots, some of whom were his fellow scientists. Surely this behavior was most troubling for him, since he expected more objectivity from them. Of course, there were legitimate questions to be raised about the theory of relativity, but many of the attacks were simply racism masquerading as a critique of relativity. The vitriolic condemnations of relativity in 1920 were the start. There were two episodes.

The first began in the summer at an anti-relativity rally in (of all places) the auditorium of the Berlin Philharmonic organised by a right-wing political group. Einstein was accused of plagiarism and propaganda. The former was a red herring, since all scientific work is based on previous work. Real plagiarism would require copying entire sections from other writings, and this Einstein never did. His work was, in part, original in the way he put together previous ideas. The so-called carp about propaganda was bizarre and exposed the blatant anti-Semitism of the whole rally. Supposedly the theory of relativity was being disseminated by mainly newspapers and publications associated with Jews. Whether true

or not, the topic was irrelevant to the veracity of the theory. This irrelevant attack showed how desperate the group was to cook up a critique. The real sinister point of this denigration of the theory was to create an etymological dichotomy between supposedly two types of science: German and Jewish. The so-called German science would later morph into what was called Aryan science, as the pseudo-scientific ideology about an Aryan race grew deeper roots, especially after the Nazis took power in 1933.

The wrangle over relativity was more focused in the second episode in the fall of 1920. It came during a scientific society meeting, where a debate was arranged between Einstein and Philipp Lenard. Lenard's name has come up before, since Mileva once attended a lecture by him and Einstein used Lenard's work on the photoelectric effect for his famous paper on light quanta. From the reports of the debate, we know that philosophical issues were at the heart of the theory. [58] However, what is important for this chapter is that the debate later became framed in the combative rhetoric of two conflicting categories of physics: German Physics (Lenard) vs. Jewish Physics (Einstein), as if there is an ethnic (really racist) basis to the way science is done. [59] The sinister side of this was made manifest in subsequent years when Lenard, along with Johannes Stark, joined the Nazi party and they attacked Einstein as expounding a Jewish Physics. Lenard put forth a warning about an "alien spirit … which appears everywhere as a dark force and which leaves its mark so clearly on everything that belongs to the 'theory of relativity'." [60] For such rhetorical gibberish, Hitler would give Lenard the highfalutin post of Chief of Aryan Physics. [61]

As the drama over relativity was playing out in the 1920s, Einstein took up another cause – the plight of Eastern European Jews. Since the late-19th century, waves of Jews fled pogroms in Russia and passed through Poland to arrive in Germany. During World War I they were recruited to work in factories for the war effort under appalling conditions. After the War some continued onward to the USA or to Palestine. Those who stayed were targets of anti-Semitism, for they were poor, usually working as peddlers,

and seen as “parasites” in German society, or worse as “vermin” – a term portending the racism of the Nazis. Eastern Jews were also often avoided by the “western” German Jews, who had integrated into German bourgeois culture and had a hard time identifying with these ghetto-living, Yiddish-speaking, skullcap-wearing co-religious folk. German authorities sometimes went so far as to put hundreds of Eastern Jews into internment camps, a move that foreshowed the concentration camps of the Nazis.

Einstein, who invariably took the side of the underdog, could not quietly watch this blatant act of discrimination of a minority, especially members of his tribe. Using his new status as a celebrity with a public voice, he wrote in support of the Eastern European Jews, and spoke out repeatedly against the rise of anti-Semitism. He challenged the German government to stop this discrimination by reminding them that during the War the Germans were accused by the enemy of acting like barbarians (which they really did in Belgium), and so in their treatment of Jews they were reinforcing their own stereotype. He weaved an image of these Jewish peddlers as not hordes of beggars but rather as “a wealth of the finest human talents and productive energy” (which, in the long run, turned out to be true, at least for those who were not murdered by the Nazis). Einstein then put this idea into practice by helping to organize special lectures for Eastern Jewish students at the University, who otherwise were not admitted. [62]

This involvement in the plight of Eastern Jews was another element in his reengagement with his Jewish identity at this time. Coupled to this was his increasing involvement in one aspect of the Zionist movement – something during the Prague sojourn he only viewed from a distance – namely, the quest to create a Hebrew University in Jerusalem. In fact, he became downright zealous about it. As he wrote, “Many talented Jews are lost to culture because the way to learning is barred to them. It will be one of the foremost aims of the university in Jerusalem to alleviate this misery.” [63] The only barrier would be a lack of talent, not ethnic origins. KWIK, he probably had Eastern European Jews in mind when he wrote this.

The idea for such an institution went back to the late-19th century, and by the 1913 meeting of the World Zionist Congress it was decided that a University whose language of instruction would be Hebrew should be built. In 1918 the organization obtained permission from the British Commonwealth to lay a cornerstone on Mount Scopus in Jerusalem, and they did so in the summer, on July 24th. Einstein thus envisaged a place where Jews from anywhere in the world, initially from Eastern Europe, could study freely, with admittance based on merit alone.

In 1921, Einstein made his first trip to the USA on a tour in support of the Zionist movement, with the specific goal of raising funds for the Hebrew University. Chaim Weizmann, chemist and president of the World Zionist Organization, prodded him to do so. Weizmann wanted Einstein to join him on this tour, since his celebrity status surely would help to draw crowds and hopefully increase donations. Einstein was not naïve about all this. He wrote: "I am not eager to go to America but am doing it solely in the interest of the Zionists, who must beg for dollars to build educational institutions in Jerusalem, and for whom I act as high priest and decoy … I am really doing whatever I can for the brothers of my race who are treated so badly everywhere." [64]

The 1921 tour was from April 2nd to May 30th, and he was often greeted at stops with much fanfare and incessant questions from reporters. Albert Einstein, now the eponym *Einstein,* was learning to adapt to the role of celebrity and the accompanying lack of any privacy. All was not just fundraising, however; he lectured at several universities on relativity. At Princeton University he gave a series of lectures that were published as the book *The Meaning of Relativity,* a work that is still in print. [65] Of course, he did not know that starting in 1933, he would spend the rest of his life in the town of Princeton, New Jersey, not far from the University. By the end of the 1921 trip Einstein was deeply devoted to the cause of creating a Hebrew University in Jerusalem.

As noted in Chapter **II**, in 1920, the tension and distress over the attacks on Einstein were, at least partially, responsible for

Elsa's ailments at this time, and led to the couple's serious thoughts of leaving Germany. Yet they stayed. They stayed despite, for example, in June 1921, after Einstein returned from this USA tour, there appeared an article in a Nationalist newspaper calling for his outright murder. Events like this spurred him further into the Zionist fold. Later in the month, he delivered a speech to a Zionist meeting in Berlin, in which he concluded:

> If we could succeed in establishing a center for the Jewish people in Palestine [then] we will have again an intellectual center and the feeling of isolation will leave us, despite the fact that most of us are scattered in all countries. This is the great liberating effect that I expect from the rebuilding of Palestine. [66]

It was followed by much applause.

In the spring of 1922 Einstein made a trip to Paris for a series of talks and seminars on relativity. When first approached by French scientists he rejected the offer, due to the lingering animosity between the two countries since the War. Johannes Stark, for example, saw it as a capitulation with the lingering enemy.[67] But Einstein was friends with Walther Rathenau, Germany's foreign minister, who saw the trip as a positive effort to mend the rift. Rathenau was, like Einstein, a Jew who was "internationally minded," as Einstein once put it. But Rathenau was also very much unlike Einstein, for (again quoting him) Rathenau "was very much in love with Prussianism, … and its military forms." [68] Einstein was probably attracted to Rathenau because of his intelligence and especially his wit and the subtle ways he could make disparaging remarks about social mores. Einstein, in the end, agreed to go to Paris. A French delegation met his train at the Belgium border to escort him to Paris; they were concerned about security, for there were threats made by some French ultra-nationalists opposed to a

Bibliography

Auster, Simon. November 25, 2013. Telephone interview regarding his visit with Einstein in August, 1952, when he was a student at Yeshiva University.

Begley, Louis. 2014. "The Good Place in Vicious France," essay review of *Village of Secrets: Defying the Nazis in Vichy France,* by Caroline Moorhead (Harper, 2014), in *The New York Review of Books* (December 18, 2014), pp. 64 – 66.

Brian, Denis. 2005. *The Unexpected Einstein: The Real Man Behind the Icon*. Hoboken, NJ: John Wiley & Sons.

Calaprice, Alice (ed.). 2005. *The New Quotable Einstein.* Princeton: Princeton University Press.

Calaprice, Alice, & Daniel Kennefick, & Robert Schulmann (eds.). 2015. *An Einstein Encyclopedia.* Princeton: Princeton University Press.

Clark, Ronald W. 1972. *Einstein: The Life and Times.* New York: Avon Books. This is the paperback reprint of the first edition of 1971.

Einstein, Albert. 1949. *Autobiographical Notes.* Trans. and edited by Paul A. Schilpp. La Salle & Chicago: Open Court Publishing. This is the corrected version of the original 1947 German manuscript, first published in *Albert Einstein: Philosopher-Scientist*, two volumes. ed. by Paul A. Schilpp. New York: Harper & Row. Vol. I, 3-95. Einstein penned this very brief autobiography at the request of Paul Schilpp to introduce this two-volume collection of essays on Einstein

by a range of 20th century scientists, philosophers, and others.

Einstein, Albert. 1950. *Out of My Later Years.* New York: Philosophical Library.

Einstein, Albert. 1954. *Ideas and Opinions.* Trans. Sonya Bergmann. New York: Bonanza Books.

Einstein, Albert. 1960. *Relativity: The Special and the General Theory.* 15th edition. Trans. Robert W. Lawson. London: Methuen & Co.

Einstein, Albert. 1974. *The Meaning of Relativity,* Fifth Edition. Princeton: Princeton University Press, 1974. This is a reprint of the first edition (1922) of the May, 1921 Lectures at Princeton University. It has the Appendix for the Second Edition (1945) and Appendix II: *Relativistic Theory of the Non-Symmetric Field* (1955), the latter (written with Bruria Kaufman) is the last scientific paper Einstein published.

Einstein, Albert. 1986. *Letters to Solovine.* Intro. by Maurice Solovine. Trans. Wade Baskin. New York: Philosophical Library.

Einstein Papers. 1987+. *The Collected Papers of Albert Einstein.* Princeton: Princeton University Press. This series began in 1987 and is an on-going project. At present, it is at volume 14(1925).See:
http://einsteinpapers.press.princeton.edu/papers

Eisinger, Josef. 2011. *Einstein on the Road.* New York: Prometheus Books.

Feuer, Lewis. 1982. *Einstein and the Generations of Science.* Second Edition. New Brunswick: Transaction Books.

Fölsing, Albrecht. 1997. *Albert Einstein: A Biography*. Trans. Ewald Osers. New York: Viking. Originally published in German 1993.

Frank, Philipp. 1947. *Einstein: His Life and Times*. Trans. George Rosen. Edited and revised by Shuichi Kusaka. New York: Alfred A. Knopf.

Gimbel, Steven. 2012. *Einstein's Jewish Science: Physics at the Intersection of Politics and Religion*. Baltimore: The John's Hopkins University Press. This is a non-racist, serious, and nuanced approach to this delicate subject.

Hillman, Bruce J. & Birgit Ertl-Wagner & Bernd C. Wagner. 2015. *The Man Who Stalked Einstein: How Nazi Scientist Philipp Lenard Changed the Course of History*. Guilford, Connecticut: L.P., an Imprint of Rowman & Littlefield.

Holton, Gerald. 1973. *Thematic Origins of Scientific Thought: Kepler to Einstein*. Cambridge, MA: Harvard University Press.

Holton, Gerald. 1996. *Einstein, History, and other Passions: The Rebellion against Science at the End of the Twentieth Century*. Reading: Addison-Wesley.

Isaacson, Walter. 2007. *Einstein: His Life and Universe*. New York: Simon & Schuster.

Jammer, Max. 1999. *Einstein and Religion: Physics and Theology*. Princeton: Princeton University Press. This is the most thorough study of this topic that I know of. He is especially good on the influence of Spinoza.

Jerome, Fred. 2002. *The Einstein File: J. Edgar Hoover's Secret War Against the World's Most Famous Scientist*. New York: St. Martin's Press.

Jerome, Fred. 2009. *Einstein on Israel and Zionism: His Provocative Ideas about the Middle East.* New York: St. Martin's Press.

Jerome, Fred & Roger Taylor. 2005. *Einstein on Race & Racism.* New Brunswick, NJ & London: Rutgers University Press.

Kuhn, Thomas S. 1987. *Black-Body Theory and the Quantum Discontinuity, 1894-1912.* Chicago: University of Chicago Press. This is a reprint, with a new Afterword, of the 1978 edition.

Marić, Mileva. 2003. *In Albert's Shadow: The Life and Letters of Mileva Marić.* ed. Milan Popović. Trans. Boško Milosavljević & Branimir Živojinović. Baltimore: The Johns Hopkins University Press. The originals are in German and Serbian.

Martinez, Alberto. 2005. "Handling Evidence in History: The Case of Einstein's Wife," *School Science Review,* 86 (March), 49-56.

Miller, Arthur I. 2001. *Einstein, Picasso: Space, Time, and the Beauty That Causes Havoc.* New York, Basic Books.

Neffe, Jürgen. 2007. *Einstein: A Biography.* Trans. Shelley Frisch. New York: Farrar, Straus, & Giroux. Originally published in German in 2005.

Nussbaumer, Harry. 2014. "Einstein's Conversion from his Static to an Expanding Universe," *The European Physical Journal: Historical Perspectives on Contemporary Physics,* Vol. 39, No.1 (February, 2014), 37-62.

Pais, Abraham. 1982. "*Subtle is the Lord": The Science and the Life of Albert Einstein.* New York: Oxford University Press.

Parker, Barry. 2003. *Einstein: The Passions of a Scientist.* Amherst, NY: Prometheus Books.

Renn, Jürgen (ed.). 2005. *Albert Einstein: Chief Engineer of the Universe. Vol. I. Einstein's Life and Work in Context; Vol. II. One Hundred Authors for Einstein; Vol. III. Documents of a Life's Pathway*. Weinheim: Wiley-Vch Verlag.

Rosten, Leo. 1970. *The Joys of Yiddish.* New York: McGraw Hill, Pocket Books.

Sayen, Jamie. 1985. *Einstein in America: The Scientist's Conscience in the Age of Hitler and Hiroshima.* New York: Crown Publishers.

Schweber, Silvan S. 2008. *Einstein and Oppenheimer: The Meaning of Genius*. Cambridge, Mass.: Harvard University Press.

Solovine, Maurice. *See*: Einstein, 1986.

Staley, Richard. 2008. *Einstein's Generation: the Origins of the Relativity Revolution.* Chicago: University of Chicago Press.

Stern, Fritz. 1999. *Einstein's German World.* Princeton: Princeton University Press. See especially Chapter 3, "Together and Apart: Fritz Haber and Albert Einstein."

Topper, David R. 2007. *Quirky Sides of Scientist: True Tales of Ingenuity and Error from Physics and Astronomy.* New York: Springer.

Topper, David R. 2013. *How Einstein Created Relativity out of Physics and Astronomy.* New York: Springer.

Topper, David R, 2014a. *Idolatry & Infinity: Of Art, Math, & God.* Boca Raton, Florida: BrownWalker Press.

Topper, David R. 2014b. "Einstein's Blunder," *The New York Review of Books* (May 8, 2014), p. 57. A letter to the editor.

Topper, David R. & Dwight Vincent, 2007. “Einstein’s 1934 Two-Blackboard Derivation of Energy-Mass Equivalence,” *American Journal of Physics*, 75 (November), 978- 983.

Vallentin, Antonina. 1954. *The Drama of Albert Einstein.* Trans. Moura Budberg. Garden City, New York: Doubleday.

Wazeck, Milena. 2014. *Einstein’s Opponents: The Pubic Controversy about the Theory of Relativity in the 1920s.* Trans. Geoffrey S. Koby. Cambridge, UK: Cambridge University Press. The original German edition was published in 2009.

Winteler-Einstein, Maja. 1987. “Albert Einstein – A Biographical Sketch (excerpt),” in *Einstein Papers,* 1987, Vol. 1, pp. xv – xxiii. His sister wrote this sketch in 1924.

EndNotes

[1] Two earlier pictures exist: at age three in a formal outfit, and a studio shot at age five with his sister.

[2] Brian, 2005, p. 8. Brian, Barbara Wolff, and I are the only authors I know of who have noticed this.

[3] Brian, 2005, pp. 104-105.

[4] Brian, 2005, p. 6.

[5] Winteler-Einstein, 1987, p. xxii.

[6] Einstein, 1949, pp. 4–5.

[7] Topper, 2013, p. 11.

[8] Winteler-Einstein, 1987, pp. xxi-xxii.

[9] Einstein, 1949, p. 9.

[10] Brian, 2005, p. 12.

[11] Holton, 1973, pp. 370-373.

[12] Holton, 1996, pp. 390-391.

[13] Miller, 2001, p. 48, has also noticed this.

[14] Miller, 2001, p. 186.

[15] *Einstein Papers,* Vol. 1, Doc. 18.

[16] For example, Neffe, 2007, p. 88.

[17] *Einstein Papers,* Vol. 1, Doc. 34.

[18] *Einstein Papers*, Vol. 1, Doc. 36.

[19] *Einstein Papers*, Vol. 1, Doc. 72.

[20] *Einstein Papers*, Vol. 1, Doc. 58.

[21] *Einstein Papers*, Vol. 1, Doc. 50.

[22] Parker, 2003, p. 46.

[23] *Einstein Papers*, Vol. 1, Doc. 75.

[24] Marić, 2003, p. 79.

[25] Brian, 2005, Chapter 4 is good summary.

[26] Einstein, 1986.

[27] *Einstein Papers*, Vol. 1, Doc. 131.

[28] Einstein, of course, was a non-practicing Jew, and she Serbian Orthodox.

[29] Martinez, 2005, dispels the rumour that Mileva was instrumental in the creation of relativity theory.

[30] *Einstein Papers*, Vol. 5, Doc. 374.

[31] Feuer, 1982, pp. xii-xix; Topper, 2013, pp. 74-75.

[32] Topper, 2013, pp. 70-73.

[33] Parker, 2003, p, 112.

[34] *Einstein Papers*, Vol.8, Doc. 22 (July 18, 1914).

[35] Vallentin, 1954, pp. 86-90.

[36] *Einstein Papers*, Vol. 8, Doc. 34a (in Vol. 10, p. 12).

[37] *Einstein Papers*, Vol. 10, Docs. 154, 165, & 166.

[38] Frank, 1947, pp. 177-178.

[39] Frank, 1947, p. 226. The cottage was at Caputh, about 20 miles southwest of Berlin, near Potsdam.

[40] Topper, 2013, p. 216; Neffe, 2007, pp. 199.

[41] Vallentin, 1954, p. 240.

[42] Calaprice, 2005, p. 73.

[43] *Einstein Papers*, Vol. 1, Doc. 111.

[44] On this debate see, Topper, 2013, pp. 74-75.

[45] Calaprice, 2005, pp. 275-277.

[46] *Einstein Papers*, Vol. 8A, Doc. 257. My translation.

[47] Solovine, 1986, pp. 8-9.

[48] Jammer, 1999, especially pp. 146-149.

[49] Calaprice, 2005, p. 197.

[50] Calaprice, 2005, p. 196.

[51] Auster, 2013.

[52] Stern, 1999, p. 80.

[53] Neffe, 2007, pp. 317-318.

[54] Einstein, 1954, p. 188.

[55] Stern, 1999, p. 74.

[56] *Einstein Papers,* Vol. 8, Doc. 34a (in Vol. 10, p. 12).

[57] Stern, 1999, p. 140.

[58] Topper, 2013, p. 123; see more recent work by Hillman, et al., 2015, pp. 57-58 and especially Wazeck, 2014, pp. 3-4 & 148-154.

[59] Gimbel, 2012, especially Chapter 4.

[60] Renn, 2005, II, p. 224.

[61] A recent book on this is Hillman, et al., 2015.

[62] Renn, 2005, II, pp. 310-313.

[63] Jerome, 2009, p. 102.

[64] Einstein, 1986, p. 41 (letter of March 8, 1921).

[65] Einstein, 1974.

[66] *Einstein Papers*, Vol. 7, Doc 50.

[67] Gimbel, 2012, p. 132.

[68] Stern, 1999, p. 194n.

[69] Einstein, 1986, p. 57.

[70] Einstein, 1986, p. 59.

[71] Clark, 1972, p. 477.

[72] *Einstein Papers*, Vol. 13, Intro. p. lxvi.

[73] Clark, 1972, pp. 477-479.

[74] "Waffle" is a good British-Canadian expression, meaning to vacillate back and forth.

[75] Calaprice, 2005, p. 129.

[76] Calaprice, 2005, p. 132.

[77] Topper, 2013, p. 124.

[78] Topper, 2013, p. 192.

[79] Stern, 1999, p. 153.

[80] Begley, 2014, p. 64.

[81] Calaprice, 2005, p. 162.

[82] Stern, 1999, p. 162.

[83] http://www.conservapedia.com/Main_Page

[84] *Einstein Papers*, Vol. 5, Doc. 445.

[85] Eisinger, 2011, p. 145.

[86] Einstein, 1950, pp. 126-129.

[87] Jerome and Taylor, 2005, pp. 88-92 & 142.

[88] Chaim Weismann, who took Einstein on the tour of the USA, was the first.

[89] Jerome, 2009, p. 76.

[90] Jerome, 2009, pp. 99-100.

[91] Jerome, 2009, p. 112.

[92] Jerome, 2009, p. 157.

[93] Einstein, 1974. See pages 113 & 130 for Einstein's 1945 comments on the three possible cosmic spaces: positive curvature, negative curvature, or flat.

[94] Topper, 2014a, pp. 79-83 for a brief summary.

[95] Topper, 2013, Chapter 2.

[96] Staley, 2008, is an excellent book on this topic.

[97] *Einstein Papers*, Vol. 1, Docs. 27 & 28.

[98] Parker, 2003, pp. 102-103, 107-109, & 112-113.

[99] Kuhn, 1987.

[100] Along with physicist Paul Ehrenfest, who later became a close friend. In 1905-1907 each was working independently.

[101] *Einstein Papers,* Vol. 5, Doc. 445.

[102] Topper, 2013, p. 40. He used this word in a letter of 1947.

[103] The first electric elevator appeared in 1857. Topper, 2013, p. 89.

[104] For more details of this story, see Topper, pp. 89-91.

[105] *Einstein Papers*, Vol. 1, Doc. 131, December 1901.

[106] Einstein, 1954, pp. 289-290. From the Glasgow lecture of 1933.

[107] Topper, 2013, p. 116.

[108] Einstein, 1960.

[109] Pais, 1982, p. 182.

[110] Topper, 2013, p. 108.

[111] Topper, 2013, Chapter 22.

[112] Topper, 2013, pp, 180-181.

[113] Topper, 2013, p. 168 & 168n14.

[114] Nussbaumer, 2014, presents strong evidence for revising the conventional thesis that Einstein's change of heart took place at Caltech.

[115] Topper, 2013, pp. 173-174. Nussbaumer makes a further assertion that Einstein probably had little contact with Hubble at Caltech, but was exposed to the astronomical data through Richard C. Tolman, the physicist and chemist, who he worked with during that trip.

[116] Topper, 2014b. Contrary to a recent assertion that this quote is a myth, I present strong evidence that the quote is indeed true. For another reference to this story, see Topper (2013), Footnote #1 on p. 165. In both cases I cite a confirmation by the cosmologist, Ralph A. Alpher, in an email of April 2, 1998, who was present at the meeting when Einstein made the remark.

[117] Topper, 2013, pp. 132-134.

[118] Topper, 2013, p. 218.

[119] Topper, 2013, p. 223.

[120] Vallentin, 1954, p. 259.

[121] Schweber, 2008, p. 35.

[122] A simple calculation is in Topper, 2007, p. 11. A discussion of this experiment is on pp. 10-12.

[123] See my book, Topper, 2007, Chapter 13. As far as I know, this explanation in unique with me.

[124] Topper, 2013, both quotes from p. 102.

[125] Topper, 2013, quoted on p. 203. Pais' italics.

[126] Calaprice, et al. 2015, pp. 178-179.

[127] Vallentin, 1954, pp. 154-155; Jammer, 1999, *passim*.

[128] Topper, 2013, p. 212.

[129] Neffe, 2007, pp 102-103; Vallentin, 1954, pp. 141-144.

[130] Brian, 2005, p. 51.

[131] Einstein, 1954, pp.151-158.

[132] Neffe, 2007, p. 377; Frank, 1947, pp. 275-278; Sayen, 1985, Chapter 6, esp. pp. 112-116.

[133] Brian, 2005, p. 154.

[134] Vallentin, 1954, p. 93.

[135] Jerome, 2002, illustration between p. 170 & 171. The five errors are: (1) in the USA Einstein was at the Institute for Advanced Study, not Princeton University; (2) Mileva's last name was Marić, not Maree; (3) he married Mileva in 1903, not 1901; (4) he married Elsa in 1919, not 1917; and (5) he and Mileva had two children, not one (of course, few knew about the third child, Lieserl, at this time, i.e., 1940).

[136] Brian, 2005, Chapter 9.

[137] Fölsing, 1997, pp. 713-714.

[138] Schweber, 2008, pp. 42-62.

[139] Topper and Vincent, 2007, p. 979.

[140] Topper, 2013, p. 220.

[141] Topper, 2013, p. 219.