プロローグ

- [1] "pale face and long hair": Alice Calaprice, ed., The Ultimate Quotable Einstein (Princeton: Princeton University Press, 2010), 58.
- [2] "one of the greatest": Ibid., 301.
- [3] "disturbs fundamentally": The Manchester Guardian, June 10, 1921, quoted in Ronald W. Clark, Einstein: The Life and Times (New York: World Publishing, 1971), 271–72.
- [4] It did not last: Clark, Life and Times, 272.

第1章

- [1] "What a paradise this land is": Samuel Clemens to William Dean Howells, May 4, 1878, in Samuel L. Clemens and William D. Howells, Mark Twain–Howells Letters: The Correspondence of Samuel L. Clemens and William D. Howells, 1872–1910, ed. Henry Nash Smith and William M. Gibson (Cambridge, Massachusetts: Belknap Press, 1960).
- [2] "his face would turn completely yellow": Collected Papers of Albert Einstein (Princeton: Princeton University Press, 1987–2006), hereafter CPAE, volume 1, "Albert Einstein—A Biographical Sketch by Maja Winteler-Einstein (Excerpt)," xviii.
- [3] **Hermann read Schiller and Heine:** Abraham Pais, Subtle Is the Lord: The Science and the Life of Albert Einstein (Oxford: Oxford University Press, 1982), 36.
- [4] "I believe altogether that love": Albrecht Fölsing, Albert Einstein (New York: Penguin, 1997), 26. Alice Calaprice, ed., The Ultimate Quotable Einstein (Princeton: Princeton University Press, 2010), 27.
- [5] **He threw a chair:** CPAE volume 1, "Albert Einstein—A Biographical Sketch by Maja Winteler-Einstein (Excerpt)," xix.
- [6] "Your mere presence here undermines": Calaprice, The Ultimate Quotable Einstein. 281.
- [7] A favorite entertainment: CPAE volume 1, "Albert Einstein—A Biographical Sketch by Maja Winteler-Einstein (Excerpt)," xix.
- [8] "sacred little geometry book": Fölsing, Albert Einstein, 23.
- [9] "could be proved with such certainty": Quoted in Ibid.
- [10] "the fetters of the merely personal": Quoted in Ibid., 24. Lorraine Daston, "A Short History of Einstein's Paradise Beyond the Personal," in Einstein for the 21st Century, ed. Peter Galison Gerald Holton, and Silvan Schweber (Princeton: Princeton University Press, 2008).
- [11] **He also admitted:** CPAE volume 1, document 22, "My plans for the future," 16.

- [12] Einstein levered his diagnosis: Fölsing, Albert Einstein, 29–30.
- [13] One of those instructors: Lewis Pyenson, The Young Einstein: The Advent of Relativity (Boca Raton: CRC Press, 1985), 81.
- [14] Einstein would read the notes: Fölsing, Albert Einstein, 57.
- [15] "I would rather not speculate": Ibid., 53.
- [16] "You are a smart boy": Pais, Subtle Is the Lord, 44.
- [17] "roaring, booming, friendly": Alice Calaprice, ed., *The New Quotable Einstein* (Princeton: Princeton University Press, 2005), 302.
- [18] **He tried to count the number:** A. Vibert Douglas, *The Life of Arthur Stanley Eddington* (London: Thomas Nelson, 1956), 2.
- [19] "some of the greatest astronomers": 20 June 1898. A. S. Eddington, "A total eclipse of the sun," O.11.22/13, Eddington Papers, Trinity College Library, University of Cambridge. Courtesy of the Master and Fellows of Trinity College, Cambridge.
- [20] "indiscriminately bruised the shins": Douglas, Arthur Stanley Eddington, 30.
- [21] "With this one friend": Ibid., 7.
- [22] He originally started smoking: Ibid., 33; Eddington's Notebook, Add. Ms. a. 48, Eddington Papers, Trinity College Library, Cambridge.
- [23] "His short skull seems unusually broad": Calaprice, Ultimate Quotable Einstein, 278.
- [24] "acted on women as a magnet": Ibid., 302.
- [25] Discouraged but not defeated: Fölsing, Albert Einstein, 68.
- [26] **Einstein sent a steady stream:** CPAE volume 1, document 136, "Einstein to Mileva Marić, 8? February 1902," 192.
- [27] She suffered an attack of scarlet fever: Abraham Pais, Einstein Lived Here (Oxford: Oxford University Press, 1994), 13.
- [28] They had to wake the landlord: Ibid., 11.
 - [29] "It enforced many-sided thinking": Fölsing, Albert Einstein, 102.
- [30] He was marked unfit: CPAE volume 1, document 91, "Military Service Book, 13 March 1901," 158.
- [31] "An ancient, exquisitely cozy city": CPAE volume 1, document 134, "Einstein to Mileva Marić, 4 February 1902," 191.
- [32] "stamp out vermin": John Norton, "How Hume and Mach Helped Einstein Find Special Relativity," in *Discourse on a New Method: Reinvigorating the Marriage of History and Philosophy of Science*, eds. Mary Domski and Michael Dickson (Chicago: Open Court, 2004), 374.
- [33] This sparked several weeks: Ibid., 367.
- [34] He declared that an analysis: Peter Galison, Einstein's Clocks, Poincaré's Maps (New York: W. W. Norton, 2003), 253.
- [35] "our work on relative motion": Pais, Einstein Lived Here, 8.
- [36] "our theory of molecular forces": CPAE volume 1, document 101, "Einstein to Mileva Marić, 15 April 1901," 166; CPAE volume 1, document 127, "Einstein to Mileva Marić, 12 December 1901," 185.
- [37] "sense of duty and deliberateness": John Heilbron, The Dilemmas of an Upright Man: Max Planck as Spokesman for German Science (Berkeley: University of California Press, 1986), 35.

- [38] It is sometimes said: Ibid., 28.
- [39] Those who read the paper: Andrew Warwick, Masters of Theory: Cambridge and the Rise of Mathematical Physics (Chicago: University of Chicago Press, 2003), 404-6.
- [40] "absolute, invariant features": Pais, Subtle Is the Lord, 150.
- [41] Einstein actually never liked: Warwick, Masters of Theory, 406.

第 2 章

- [1] In all, he spent: A. Vibert Douglas, *The Life of Arthur Stanley Eddington* (London: Thomas Nelson, 1956), 15.
- [2] When he was taken: Eddington's Notebook, Add. Ms. a. 48, Eddington Papers, Trinity College Library, Cambridge.
- [3] Eddington became known: Douglas, Arthur Stanley Eddington, 24.
- [4] He didn't care much: Ibid., 18.
- [5] "I believe I sewed him": Ibid., 34.
- [6] The Nobel Prize winners: Albrecht Fölsing, Albert Einstein: A Biography (New York: Viking, 1997), 132.
- [7] "I admire that man": Ibid., 216.
- [8] Works of genius: Ibid., 203.
- [9] "highly suspicious": John Stachel, "The First Two Acts," in *The Genesis of General Relativity*, vol. 2, ed. Jürgen Renn (Dordrecht: Springer, 2007), 84.
- [10] "the happiest thought of my life": CPAE volume 7, document 31, "Ideas and Methods," 136.
- [11] I was sitting: Jürgen Renn, "Classical Physics in Disarray," in Genesis of General Relativity, vol. 1, ed. Jürgen Renn, n.d., 63.
- [12] "of the exact same nature": Jürgen Renn and Matthias Schemmel, eds., *The Genesis of General Relativity, Volume 1*, Boston Studies in the Philosophy and History of Science (Dordrecht: Springer, 2007), 494.
- [13] **It had been known:** CPAE volume 5, document 69, "Einstein to Conrad Habicht, December 24, 1907," 47.
- [14] "So now I am": Fölsing, Albert Einstein, 246-51.
- [15] Despite his father's efforts: Ibid., 241.
- [16] His grooming habits: Ibid., 262.
- [17] **He liked to joke:** Ibid., 273.
- [18] These were tasks: Ibid., 294-95.
- [19] "I consider myself": CPAE volume 5, document 389, "Einstein to Elsa Einstein, 30 April 1912," 292.
- [20] Participation in international: Roy M. MacLeod, "The Chemists Go to War: The Mobilization of Civilian Chemists and the British War Effort, 1914–1918," Annals of Science 50 (1993): 457.
- [21] "meant more than": Martin J. Klein, Paul Ehrenfest, Volume I: The Making of a Theoretical Physicist (New York: Elsevier Science, 1970), 303.
- [22] "Lorentz is a marvel": CPAE volume 5, document 305, "Einstein to Heinrich Zangger, 15 November 1911," 222.
- [23] "fatherly kindness": CPAE volume 5, document 360, "Einstein to Hendrik A. Lorentz, 18 February 1912," 262–63.

- [24] "the strangest thing": Fölsing, Albert Einstein, 154.
- [25] "One has every right": Alice Calaprice, ed., *The Ultimate Quotable Einstein* (Princeton: Princeton University Press, 2010), 281.
- [26] "the barking of a seal": Ibid., 294.
- [27] "Henceforward space": Fölsing, Albert Einstein, 243.
- [28] "Since the mathematicians": Ibid., 245.
- [29] "It is greatly": Ibid., 308.
- [30] "One thing can": CPAE volume 5, document 281, "Einstein to Erwin Freundlich, 1 September 1911," 201–2.
- [31] He saw no: Fölsing, Albert Einstein, 309.
- [32] "complete unselfishness": Douglas, Arthur Stanley Eddington, 19.
- [33] "scientific maturity": Alex Soojung-Kim Pang, Empire and the Sun: Victorian Solar Eclipse Expeditions (Stanford: Stanford University Press, 2002), 39.
- [34] "mummy": Eddington's Notebook, Add. Ms. a. 48, Eddington Papers, Trinity College Library, Cambridge.
- [35] The trains: Pang, Empire and the Sun, 130-31.
- [36] There was intense: Eddington, "Report on an expedition to Passa Quatro, Brazil," MNRAS 73 (1912), 386–90.
- [37] "The scene was like fairyland": Eddington's Notebook, Add. Ms. a. 48, Eddington Papers, Trinity College Library, Cambridge.
- [38] He was known: Douglas, Arthur Stanley Eddington, 98.
- [39] "Schwarzschild & five mad Englishmen": 5 August 1913, Eddington to Sarah Ann Eddington, EDDN A 3/1. Eddington Papers, Trinity College Library, Cambridge.
- [40] "His interest in women": Douglas, Arthur Stanley Eddington, 30.
- [41] "not universally beloved": Ibid., 90.
- [42] He would meet: Ibid., 109.
- [43] Fear of growing: Catherine Rollet, "The Home and Family Life," in Capital Cities at War: Paris, London, Berlin 1914–1919: A Cultural History, vol. 2, eds. Jay Winter and Jean-Louis Robert, Studies in the Social and Cultural History of Modern Warfare (Cambridge: Cambridge University Press, 1997), 316.
- [44] The arms race: John H. Morrow Jr., The Great War: An Imperial History (New York: Routledge, 2014), 24.
- [45] When Kaiser Wilhelm: Christopher Clark, The Sleepwalkers: How Europe Went to War in 1914 (New York: Allen Lane, 2012), 181.
- [46] **Nonetheless the system:** Morrow, *The Great War*, 27.
- [47] "Do you know who": Clark, The Sleepwalkers, 54.

第 3 章

- [1] "In a certain sense": John Norton, "'Nature Is the Realisation of the Simplest Conceivable Mathematical Ideas': Einstein and the Canon of Mathematical Simplicity," Studies in History and Philosophy of Modern Physics 31, no. 2 (2000): 137.
- [2] "If you want": Albert Einstein, "On the Method of Theoretical Physics," in *Ideas and Opinions*, ed. Sonja Bargmann (New York: Wings Books, 1954), 270.

- [3] And electromagnetism: Hendrik Lorentz, "Considerations on Gravitation," in *The Genesis of General Relativity* vol. 3, ed. Jürgen Renn (Dordrecht: Springer, 2007), 113.
- [4] In particular, Abraham: Jürgen Renn, "The Summit Almost Scaled," in Ibid., 310.
- [5] "That's what happens": Quoted in Norton, "Nature Is the Realisation of the Simplest Conceivable Mathematical Ideas," 143.
- [6] "a stately beast": Quoted in John D. Norton, "Einstein, Nordström, and the Early Demise of Scalar, Lorentz Covariant Theories of Gravitation," in Renn, Genesis vol. 3, 422.
- [7] his theory was robust: Jürgen Renn and Matthias Schemmel, "Introduction," in Ibid., 13–14.
- [8] "Every step": Einstein 1907 (Vol. 2, Doc. 47), "Einstein to Michele Besso, 1912," cited in CPAE volume 4, "Introduction," xv.
- [9] "Those who": John Stachel, "The First Two Acts," in *The Genesis of General Relativity* vol. 1, ed. Jürgen Renn (Dordrecht: Springer, 2007), 99.
- [10] "Grossmann, you must": Abraham Pais, Subtle Is the Lord: The Science and Life of Albert Einstein (Oxford: Oxford University Press, 1982), 212.
- [11] "Never in my life": Albrecht Fölsing, Albert Einstein: A Biography (New York: Viking, 1997), 315.
- [12] **He thanked Grossmann:** Thomas Levenson, *Einstein in Berlin* (New York: Bantam Books, 2003), 105.
- [13] **Einstein's notebook:** See Jürgen Renn and Matthias Schemmel, eds., *The Genesis of General Relativity, Volume 1*, Boston Studies in the Philosophy and History of Science (Dordrecht: Springer, 2007), for a page-by-page commentary on the notebook.
- [14] "much too feeble": Jürgen Renn and Tilman Sauer, "Pathways out of Classical Physics," in *The Genesis of General Relativity Volume 1*, ed. Jürgen Renn (Dordrecht: Springer, 2007), 113–312, 263.
- [15] "the theory refutes": Fölsing, Albert Einstein, 317.
- [16] "more in the nature": Ibid.
- [17] Not reassuring: Michel Janssen and Jürgen Renn, "Einstein Was No Lone Genius," Nature 527, no. 7578 (November 2015): 298–300.
- [18] The cigar-puffing: Fölsing, Albert Einstein, 324.
- [19] "You understand": Ibid., 325.
- [20] **Patronage of the sciences:** Levenson, Einstein in Berlin, 4–5.
- [21] The salary would be: Fölsing, Albert Einstein, 328.
- [22] Many of the donors: Jeffrey Johnson, *The Kaiser's Chemists* (Chapel Hill: University of North Carolina Press, 1990), 89–90.
- [23] **The flower:** Levenson, Einstein in Berlin, 1–2.
- [24] **The famous physiologist:** Hubert Goenner and Giuseppe Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," *Science in Context* 9, no. 4 (1996): 329–30.
- [25] "indulge wholly": Fölsing, Albert Einstein, 330–31.
- [26] **But the major reason:** CPAE volume 8, document 94, "Einstein to Heinrich Zangger, 7 July 1915," 109–110.
- [27] **They stayed in Haber's house:** Fritz Stern, *Einstein's German World* (Princeton: Princeton University Press, 2001), 64.

- [28] **He said he was only willing:** CPAE volume 8, document 23, "Einstein to Mileva Einstein-Marić, 18 July 1914," 33.
- [29] **She must cease:** CPAE volume 8, document 22, "Memorandum to Mileva Einstein-Marić, with Comments, 18 July 1914," 32–33.
- [30] Einstein, crying: Stern, Einstein's German World, 65.
- [31] **He wrote a note:** CPAE volume 8, document 26, "Einstein to Elsa Einstein, 26 July 1914." 35.
- [32] **He decided that:** CPAE volume 8, document 27, "Einstein to Elsa Einstein, after 26 July 1914," 36.
- [33] "You get so much": CPAE volume 8, document 6, "Einstein to Adolf Hurwitz and Family, 4 May 1914," 13.
- [34] "sheer amount": CPAE volume 10 (cited as volume 8), document 16a, "Einstein to Zangger, 27 June 1914," 11.
- [35] "a certain discipline": Levenson, Einstein in Berlin, 31.
- [36] Nonetheless, Planck: Fölsing, Albert Einstein, 335.
- [37] "as much respect": CPAE volume 10 (cited as volume 8), document 16a, "Einstein to Zangger, 27 June 1914," 12.
- [38] no less than a complete reworking: Albert Einstein, "Principles of Theoretical Physics," in *Ideas and Opinions*, ed. Sonja Bargmann (New York: Wings Books, 1954), 222–23.
- [39] With Planck's help: Klaus Hentschel, The Einstein Tower (Stanford: Stanford University Press, 1997), 22.
- [40] The Academy covered: Fölsing, Albert Einstein, 356.
- [41] "celebrate the system": "The British Association in Australia," Science 39, no. 1015 (June 12, 1914): 864–65.
- [42] At one astronomical meeting: A. Vibert Douglas, The Life of Arthur Stanley Eddington (London: Thomas Nelson, 1956), 121–22.
- [43] Eddington's letters home: Ibid., 90.
- [44] Eddington delivered: Ibid., 91.
- [45] Bystanders recall: Christopher Clark, The Sleepwalkers: How Europe Went to War in 1914 (New York: Allen Lane, 2012), 374.
- [46] The Austrian authorities: Ibid., 388.
- [47] Ironically, Franz Ferdinand: Ibid., 393–95.
- [48] Germany advised: Ibid., 417.
- [49] "the most insolent document": Ibid., 456.
- [50] The reply arrived: Ibid., 463.
- [51] Germany sent spies: Ibid., 524.
- [52] "honourable expectation": Ibid., 540.
- [53] "sort of a grunt": Ibid., 541.
- [54] "destroy civilization": John Morrow, *The Great War: An Imperial History* (New York: Routledge, 2014), 30.
- [55] He was taken to Odessa: Hentschel, The Einstein Tower, 22.
- [56] The chemist William Herdman: The Observatory 479 (October 1914): 397.
- [57] "fine prize": Douglas, Arthur Stanley Eddington, 91–92.
- [58] This was a real possibility: The Observatory 485 (March 1915): 155.
- [59] "quite negligible": Adrian Gregory, *The Last Great War* (Cambridge: Cambridge University Press, 2008), 16–18.

- [60] "a sin against civilization": Stefan L. Wolff, "Physicists in the 'Krieg der Geister': Wilhelm Wien's 'Proclamation," Historical Studies in the Physical and Biological Sciences 33, no. 2 (2003): 340.
- [61] "a glimpse of Ministers": Gregory, The Last Great War, 13.
- [62] The windows of the German embassy: Alan Wilkinson, *The Church of England and the First World War* (London: Lutterworth, 2014), 12.
- [63] "The country calls": Ibid., 33.
- [64] **The BEF happily embraced:** Winston Groom, *A Storm in Flanders* (Grove Press, 2003), 13.
- [65] "I am musing": CPAE volume 8, document 34, "Einstein to Paul Ehrenfest, 19 August 1914," 41–42.
- [66] "The German people": John Heilbron, The Dilemmas of an Upright Man: Max Planck as a Spokesman for German Science (Berkeley: University of California Press, 1986), 71.
- [67] "that all the moral": Stern, Einstein's German World, 44.
- [68] "The individual disappeared": Jon Lawrence, "Public Space, Political Space," in Capital Cities at War: Paris, London, Berlin 1914–1919; A Cultural History, vol. 2, eds. Jay Winter and Jean-Louis Robert, Studies in the Social and Cultural History of Modern Warfare (Cambridge: Cambridge University Press, 1997), 283.
- [69] "Nowhere is there": CPAE volume 10 (cited as volume 8), document 34a, "Einstein to Zangger, 24 August 1914," 13.
- [70] A week later: Adrian Gregory, "Railway Stations," in Winter and Robert, Capital Cities at War. 28–29.
- [71] **The Germans had to:** John Keegan, *The First World War* (London: Hutchinson, 1998), 87.
- [72] Their 2,000-pound shells: Ibid., 96.
- [73] Even Moltke: Ibid., 92.
- [74] "I went along under cover": Quoted in Peter Hart, *Fire and Movement* (Oxford University Press, 2014), 94.
- [75] **During the battle:** Keegan, *The First World War*, 110.
- [76] "before the leaves fall": Groom, A Storm in Flanders, 31.
- [77] Nearly a quarter-million books: Keegan, The First World War, 93.
- [78] **Among the troops:** William Van der Kloot, *Great Scientists Wage the Great War* (Oxford: Fonthill Books, 2014), 22–23.
- [79] **On September 2:** Keegan, *The First World War*, 121.
- [80] They were so close: Kurt Mendelssohn, The World of Walther Nernst: The Rise and Fall of German Science (Pittsburgh: University of Pittsburgh Press, 1973), 80.
- [81] "be killed": Holger H. Herwig, The Marne, 1914: The Opening of World War I and the Battle That Changed the World (New York: Random House, 2009), 244.
- [82] **Soon, the only remaining:** Groom, A Storm in Flanders, 33.
- [83] The death of so many: Keegan, The First World War, 143.
- [84] By the time the battle ended: Ibid., 146.
- [85] Their astronomical equipment: Hentschel, The Einstein Tower, 22. Fölsing, Albert Einstein, 357. Levenson, Einstein in Berlin, 59–60.

- [86] "The observations": CPAE volume 10 (cited as volume 8), document 34a, "Einstein to Zangger, 24 August 1914," 13.
- [87] "heroism on command": Levenson, Einstein in Berlin, 60.
- [88] The international catastrophe: CPAE volume 8, document 39, "Einstein to Paul Ehrenfest, December 1914," 46–47.

第 4 章

- Irreplaceable cultural treasures: John Horne and Alan Kramer, German Atrocities, 1914: A History of Denial (New Haven: Yale University Press, 2001): 38–40.
- [2] HOLOCAUST OF LOUVAIN: Ibid., 117.
- [3] "blind, barbarian" act: Ibid., 231.
- [4] IT IS NOT TRUE THAT OUR TROOPS: G. F. Nicolai, *The Biology of War* (New York: The Century Co., 1919), ix.
- [5] IT IS NOT TRUE THAT FIGHTING: Ibid.
- [6] Einstein's friends: Stefan L. Wolff, "Physicists in the 'Krieg der Geister': Wilhelm Wien's 'Proclamation,'" Historical Studies in the Physical and Biological Sciences 33, no. 2 (2003): 341.
- [7] Planck and Klein: John Heilbron, The Dilemmas of an Upright Man: Max Planck as a Spokesman for German Science (Berkeley: University of California Press, 1986), 70.
- [8] "as members": Hubert Goenner and Giuseppe Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," Science in Context 9, no. 4 (1996): 331
- [9] "of real celebrity": Nicolai, Biology of War, xiv.
- [10] **Instead of saving:** Wolff, "Physicists in the 'Krieg der Geister,'" 343.
- [11] "We grieve profoundly": Daniel Inman, "Theologians, War, and the Universities," Journal for the History of Modern Theology 22, no. 2 (2015): 168–89, 176.
- [12] The reply had been organized: Ibid., 175.
- [13] "collective insanity": CPAE volume 9, document 80, "Einstein to Hendrik A. Lorentz, 1 August 1919," 68.
- [14] "sexual character of the male": CPAE volume 10 (cited as volume 8), document 41a, "Einstein to Zangger, 27 December 1914," 13.
- [15] His close connections: Wolf Zuelzer, The Nicolai Case (Detroit: Wayne State University Press, 1982), 17–20.
- [16] "wonder for the first time": Ibid., 25.
- [17] Never has any: Nicolai, Biology of War, xvii-xix.
- [18] "Although I am": CPAE vol. 8, document 57, "Einstein to Georg Nicolai, 20 February 1915," 69.
- [19] Only two others: Goenner and Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," 333.
- [20] The famed zoologist: Martin J. Klein, Paul Ehrenfest, Volume I: The Making of a Theoretical Physicist (New York: Elsevier Science, 1970), 299.
- [21] "be healed": Zuelzer, The Nicolai Case, 345.
- [22] Students studied: Stefan Goebel, "Schools," in Capital Cities at War: Paris, London, Berlin 1914–1919: A Cultural History, vol. 2, eds. Jay Winter and

- Jean-Louis Robert, Studies in the Social and Cultural History of Modern Warfare (Cambridge: Cambridge University Press, 1997), 211–16.
- [23] Einstein was member: Goenner and Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," 334–35.
- [24] October 29: Thomas Levenson, Einstein in Berlin (New York: Bantam Books, 2003), 85.
- [25] This led to: See John Stachel, "The Hole Argument and Some Physical and Philosophical Implications," *Living Reviews of Relativity* 17, no. 1 (December 2014), 5–66.
- [26] "physics too": Wolff, "Physicists in the 'Krieg der Geister,'" 337–38.
- [27] "enemy foreigners": Ibid., 346.
- [28] Foreign terms: Ibid., 339.
- [29] Unjustified English influence: Ibid., 348.
- [30] "a crusade": Ibid., 353.
- [31] Critics argued: See, for instance, the anonymous pamphlet Some Arguments for the Maintenance of Voluntary Service (London: St. Clements Press [1915?]).
- [32] At his request: John Stevenson, *British Society 1914–45* (London: Allen Lane, 1984), 47.
- [33] There were not enough doctors: Michael Robinson, "Broken Soldiers," *History Ireland* 24 (March/April 2016): 30–32, 31.
- [34] Cambridge and Oxford: Stevenson, British Society, 52-53.
- [35] At the end of August: Arthur Marwick, The Deluge: British Society and the First World War (Basingstoke: Macmillan, 1991), 35.
- [36] **By October:** Paul Fussell, *The Great War and Modern Memory* (Oxford: Oxford University Press, 1975), 9.
- [37] Adm. Charles Penrose: Nicoletta Gullace, "White Feathers and Wounded Men: Female Patriotism and the Memory of the Great War," *Journal of British Studies* 36, no. 2 (April 1997): 178–206, 193.
- [38] Graham Greene: Royal Society Council Minutes (hereafter RSCM), vol. 10, 258, November 1, 1917. Courtesy of Royal Society.
- [39] One of the highest-ranking: The Times, November 1, 1914.
- [40] Fewer than half: James McDermott, *British Military Service Tribunals* 1916–1918 (Manchester: Manchester University Press, 2011), 13–14.
- [41] So the owner of a munitions factory: The National Archives of the UK (TNA): Public Record Office (PRO) (hereafter TNA:PRO), MH 47/1: Central Tribunal Minutes, April 6, 1916.
- [42] It springs from: A. Ruth Fry, A Quaker Adventure (London: Nisbet and Co., 1926), xvii. See also Hugh Barbour, "The 'Lamb's War' and the Origins of the Quaker Peace Testimony," in The Pacifist Impulse in Historical Perspective, ed. Harvey Dyck (Toronto: University of Toronto Press, 1996), 145–58
- [43] **We find ourselves:** Rufus Jones, *A Service of Love in War Time* (New York: Macmillan Co., 1920), 3–4.
- [44] "Whatever may be": Ibid., 65-66.
- [45] **Those philanthropists:** Peter Gatrell and Philippe Nivet, "Refugees and Exiles," in *The Cambridge History of the First World War*, vol. 2, ed. Jay Winter (Cambridge: Cambridge University Press, 2014), 194.
- [46] Jonckhèere walked: The Observatory 485 (March 1915): 143-45.

- [47] Louvain was again: Horne and Kramer, German Atrocities, 240.
- [48] **However, the fighting:** Susan Grayzel, "Men and Women at Home," in Winter, *The Cambridge History of the First World War*, 96.
- [49] **They were uniformed:** Adrian Gregory, "Railway Stations," in Winter and Robert, *Capital Cities at War*, 35.
- [50] The green lawns: Fussell, The Great War and Modern Memory, 43.
- [51] Further, its domestic agriculture: Adrian Gregory, "Imperial Capitals at War," London Journal 42, no.3 (November 2016), 219-232, 227.
- [52] Bread became scarce: Belinda Davis, Home Fires Burning: Food, Politics, and Everyday Life in World War I Berlin (Chapel Hill: University of North Carolina Press, 2000), 24.
- [53] Angry Berliners: Ibid., 27.
- [54] The black market: Adrian Gregory, The Last Great War (Cambridge: Cambridge University Press, 2008), 227.
- [55] "butter riots": Davis, Home Fires Burning, 1.
- [56] **Synthetic nitrate:** Fritz Stern, *Einstein's German World* (Princeton: Princeton University Press, 2001), 119.
- [57] **Einstein was supposed to:** Albrecht Fölsing, *Albert Einstein: A Biography* (New York: Viking, 1997), 354–55.
- [58] The government came to view: Gerald Feldman, "A German Scientist Between Illusion and Reality: Emil Fischer, 1909–1919," in *Deutschland in der Weltpolitik des* 19. und 20. *Jahrhunderts*, eds. Imanuel Geiss and Bernd Jürgen Wendt (Düsseldorf: Bertelsmann Universitätsverlag, 1973), 341–62, 356.
- [59] "He died as a soldier": Stern, Einstein's German World, 121.
- [60] **The faculty of:** Elizabeth Fordham, "Universities," in Winter and Robert, *Capital Cities at War*, 262.
- [61] He replied that Chadwick: Russell McCormmach, Night Thoughts of a Classical Physicist (Cambridge, Massachusetts: Harvard University Press, 1982), 144, 210.
- [62] King's College: Fordham, "Universities," 266.
- [63] **Immigrants were no longer:** Panikos Panayi, "Minorities," in Winter, *The Cambridge History of the First World War*, 222.
- [64] Postal censorship: Niall Ferguson, The Pity of War (Basic Books, 1998), 186.
- [65] He spent the length: Wolff, "Physicists in the 'Krieg der Geister," 339. McCormmach, Night Thoughts, 143, 210.
- [66] Albrecht Penck: Roy MacLeod, "'Kriegsgeologen and Practical Men': Military Geology and Modern Memory, 1914–18," British Journal for the History of Science 28, no.4 (1995): 427–50, 431.

第 5 章

- [1] It claimed hundreds of thousands: Ernest Rutherford, "Henry Gwyn Jeffreys Moseley," *Nature* 96, no. 2393 (September 9, 1915): 33–34. John Heilbron, "The Work of H.G.J. Moseley," *Isis* 57, no. 3 (1966): 336–64.
- [2] "Had the European War": Quoted in Daniel Kevles, The Physicists (Harvard University Press, 1995), 113.

- [3] "a heavy loss": K. Fajans, Die Naturwissenschaften 4 (1916), 381–82.
- [4] "pride for their": Rutherford, "Henry Gwyn Jeffreys Moseley," 33.
- [5] "we cannot but recognise": Ibid., 34.
- [6] A single lab: Roy M. MacLeod, "The Chemists Go to War: The Mobilization of Civilian Chemists and the British War Effort, 1914–1918," *Annals of Science* 50 (1993): 473.
- [7] "Killed in Flanders": "Waste of Brains," The Times, December 24, 1916.
- [8] No longer: Alan Wilkinson, The Church of England and the First World War (London: Lutterworth, 2014), 212.
- [9] A piano: The Manchester Guardian, May 13, 1915.
- [10] "vendetta": Adrian Gregory, The Last Great War (Cambridge: Cambridge University Press, 2008), 236.
- [11] "No Compromise": Panikos Panayi, "Minorities," in Winter, *The Cambridge History of the First World War*, 216–41, 227.
- [12] I love science: CPAE volume 8, document 45, "Einstein to Paolo Straneo, 7 January 1915," 57.
- [13] "the only thing": CPAE volume 8, document 84, "Einstein to Heinrich Zangger, 17 May 1915," 97.
- [14] "The theoretician is led": CPAE volume 8, document 52, "Einstein to Hendrik Lorentz, 3 February 1915," 65.
- [15] "personal view": CPAE volume 8, document 43, "From Hendrik A. Lorentz to Einstein, between 1 and 23 January 1915," 53.
- [16] "kaleidoscopic mixture": Quoted in Jürgen Renn and Tilman Sauer, "Pathways Out of Classical Physics," in *The Genesis of General Relativity* vol. 1, ed. Jürgen Renn (Dordrecht: Springer, 2007), 257.
- [17] **Freundlich's supervisor:** CPAE volume 8, document 54, "Einstein to Erwin Freundlich, 5 February 1915," 66.
- [18] "work on gravitation progresses": Renn and Sauer, "Pathways," 251.
- [19] "brought, in a sense": CPAE volume 8, document 45, "Einstein to Paolo Straneo, 7 January 1915," 57.
- [20] "I am working tranquilly": CPAE volume 8, document 44, "Einstein to Edgar Meyer, 2 January 1915," 56.
- [21] "exceedingly modest": CPAE volume 8, document 75, "Einstein to Tullio Levi-Civita, 14 April 1915," 89.
- [22] The most recent issue: "Notes," The Observatory 479 (October 1914): 392.
- [23] "Owing to the cutting": Pickering to Dyson, October 8, 1914, Cambridge University Library, Royal Greenwich Observatory Archives, Papers of Frank Dyson, MS.RGO.8/104.
- [24] American astronomers: Dyson to Pickering, October 20, 1914, Papers of Frank Dyson, op. cit.
- [25] **Strömgren assured astronomers:** Strömgren to Dyson, November 6, 1914; Dyson to Pickering, November 9, 1914, Papers of Frank Dyson, op. cit.
- [26] It was refused again: Dyson to Postmaster General, November 18, 1914; Post office to Dyson, November 27, 1914, Papers of Frank Dyson, op. cit.
- [27] "the appearance of assisting": Plummer to Dyson, November 26, 1914; Plummer to Dyson, December 3, 1914, Papers of Frank Dyson, op. cit.

- [28] "would prefer": R.T.A. Innes at Johannesburg to Dyson, December 10, 1914, Papers of Frank Dyson, op. cit.
- [29] "considerate German": Lawrence Badash, "British and American Views of the German Menace in World War I," Notes and Records of the Royal Society of London 34, no. 1 (July 1979): 95.
- [30] A. B. Basset: Ibid., 94.
- [31] At the 1915 BA meeting: Ibid., 96.
- [32] "unimaginative German hands": Ibid., 96-97.
- [33] Nonetheless, he remained: Ibid., 97.
- [34] "abstract, heavy, obscure": Anne Rasmussen, "Mobilising Minds," in The Cambridge History of the First World War, vol. 2, ed. Jay Winter (Cambridge: Cambridge University Press, 2014), 405.
- [35] "pull down from": Badash, "British and American Views," 99–100.
- [36] Reports of scientists: The Observatory 489 (July 1915): 306.
- [37] "a symbol that the Empire": The Observatory 492 (October 1915): 409.
- [38] The 1915 meeting: Ibid., 413.
- [39] It is very sad: A. S. Eddington to Annie Jump Cannon, July 3, 1915, Annie Jump Cannon Papers, Harvard University Archives HUGFP 125.12 Box 2 HAIUPX. Courtesy of the Harvard University Archives.
- [40] "science is thicker than blood": W. W. Campbell, "International Co-operation in Science," September 15, 1917, attached to Campbell to G. E. Hale, September 19, 1917, Box 9, Folder 6, George Ellery Hale Papers, Archives, California Institute of Technology.
- [41] They ran refugee camps: Report of the War Victims' Relief Committee of the Society of Friends (London: Spottiswoode & Co., 1914–1919), vol. 1, 5, vol. 3, 44.
- [42] **organized to aid enemy citizens:** Ibid., 13.
- [43] The Emergency Committee received: Ibid., 15.
- [44] **They did not approve:** Rufus Jones, *A Service of Love in War Time* (New York: Macmillan Co., 1920), 252.
- [45] **His breakthrough of ammonia:** Fritz Stern, *Einstein's German World* (Princeton: Princeton University Press, 2001), 85.
- [46] He converted to Christianity: Ibid., 73–74.
- [47] "uncritical acceptance": L. F. Haber, The Poisonous Cloud (Oxford: Clarendon Press, 1986), 2.
- [48] Haber's experiments: Ibid., 27.
- [49] Then, they waited: Guy Hartcup, The War of Invention: Scientific Developments, 1914–18 (London: Brassey's Defence Publishers, 1988), 96.
- [50] **creeping forward:** Haber, *Poisonous Cloud*, 34.
- [51] The Germans were unprepared: John Keegan, The First World War (London: Hutchinson, 1998), 214.
- [52] "troubles the mind": Haber, Poisonous Cloud, 277.
- [53] His subordinates grew rapidly: Hartcup, War of Invention, 105.
- [54] As a stopgap: Haber, Poisonous Cloud, 45.
- [55] Ironically, the first: Ibid., 31.
- [56] The Chemical Society of London: Roy MacLeod, "Scientists," in Winter, The Cambridge History of the First World War, vol. 2, 443.

- [57] "The Chemical Society considers": Lawrence Badash, "British and American Views of the German Menace in World War I," Notes and Records of the Royal Society of London 34, no. 1 (July 1979): 110.
- [58] Stunned, Haber threw: Stern, Einstein's German World, 122-23.
- [59] "Mrs. Haber shot herself": CPAE volume 8, document 83, "Einstein to Mileva Einstein-Marić, 15 May 1915," 97.
- [60] As with Haber: Suman Seth, Crafting the Quantum: Arnold Sommerfeld and the Practice of Theory, 1890–1926, Transformations: Studies in the History of Science and Technology (Cambridge, Massachusetts: MIT Press, 2010), 74–79.
- [61] In the fall of 1914: RCSM, vol. 10 (November 5, 1914): 475.
- [62] The War Office did not: MacLeod, "The Chemists Go to War," 461.
- [63] Germany's dominance: RSCM, April 22, 1915. For an example, see the correspondence between the War Committee and chemical manufacturers trying to replicate German glues. Royal Society Council Documents (CD), CD/67 "Advice to Chemical Manufacturers"—CD/67.
- [64] It was found that: William Henry Perkin, "Presidential Address: The Position of the Organic Chemical Industry," *Journal of the Chemical Society*, *Transactions* 107 (1915): 557–78.
- [65] Britain was almost completely: MacLeod, "The Chemists Go to War," 459.
- [66] Their formal request: Marwick, Deluge, 229.
- [67] The military had: Ibid., 230.
- [68] A committee of major scientists: Peter Alter, The Reluctant Patron: Science and the State in Great Britain (New York: Berg, 1987), 96–97.
- [69] "On our side": William Van der Kloot, Great Scientists Wage the Great War (Oxford: Fonthill Books, 2014), 93.
- [70] The Royal Society Council: Heilbron, "The Work of H.G.J. Moseley," 336.
- [71] The Braggs were so effective: Arne Schirrmacher, "Sounds and Repercussions of War: Mobilization, Invention, and Conversion of First World War Science in Britain, France and Germany," *History and Technology: An International Journal* 32, no. 3 (October 9, 2016): 269.
- [72] In an effort to maintain: Roy MacLeod, "Sight and Sound on the Western Front," War and Society 18 (2000), 23–46, 39.
- [73] By the end of the war: MacLeod, "Scientists," 451.
- [74] Much of the gas: Hartcup, War of Invention, 168.
- [75] **The cylinders:** Ibid., 98–100.
- [76] The British system: MacLeod, "The Chemists Go to War," 466.
- [77] Australia sent about half: Roy M. MacLeod, "The 'Arsenal' in the Strand: Australian Chemists and the British Munitions Effort 1916–1919," Annals of Science 46 (1989): 58.
- [78] She was denied: MacLeod, "The Chemists Go to War," 475.
- [79] One industrial chemist: TNA:PRO: MH 47/1: Central Tribunal Minutes.
- [80] After the system: MacLeod, "The Chemists Go to War," 474.
- [81] They argued that: Cambridge Observatory Syndicate Minutes, 1896–1971, December 6, 1915, Cambridge University Archives, UA Obsy A1 iii.
- [82] The Society was still: RSCM, February 22, 1917.
- [83] Life for scientists: Hartcup, War of Invention, 35.

- [84] They, too, had no clear guidelines: MacLeod, "The Chemists Go to War," 474.
- [85] "standing eye to eye": Niall Ferguson, *The Pity of War* (Basic Books, 1998), 207.
- [86] **Erwin Schrödinger:** Walter Moore, *Schrödinger: Life and Thought* (Cambridge: Cambridge University Press, 1989), 83.
- [87] A year into the war: Van der Kloot, Great Scientists Wage the Great War, 34.
- [88] "no longer knew": Ibid., 34.
- [89] Meitner felt strongly: Russell McCormmach, Night Thoughts of a Classical Physicist (Cambridge, Massachusetts: Harvard University Press, 1982), 171.
- [90] "Einstein played the violin": Hubert Goenner and Giuseppe Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," Science in Context 9, no. 4 (December 1996): 369.
- [91] Walther Schücking: Ibid., 336.
- [92] **Einstein took it out:** CPAE volume 8, document 86, "Einstein to Heinrich Zangger, 28 May 1915," 100–101.
- [93] "until now not politically active": Goenner and Castagnetti, "Albert Einstein as Pacifist," 372.
- [94] "a woman's world": Emmanuelle Cronier, "The Street," in Capital Cities at War: Paris, London, Berlin 1914–1919: A Cultural History, vol. 2, eds. Jay Winter and Jean-Louis Robert, Studies in the Social and Cultural History of Modern Warfare (Cambridge: Cambridge University Press, 1997), 88.
- [95] Some 70,000 Eastern European Jews: Ibid., 96.
- [96] Right-wing groups: Adrian Gregory, "Religious Sites and Practices," in Capital Cities at War, vol. 2, 406–17, 406–8.
- [97] This should not be mistaken: McCormmach, Night Thoughts, 213.
- [98] It was not well received: John Heilbron, The Dilemmas of an Upright Man: Max Planck as Spokesman for German Science (Berkeley: University of California Press, 1986), 74–78.

第6章

- [1] **He speculated about:** A. S. Eddington, "Some Problems in Astronomy XIX: Gravitation," *The Observatory* 484 (1915): 93–98.
- [2] Cunningham was: Andrew Warwick, Masters of Theory: Cambridge and the Rise of Mathematical Physics (Chicago: University of Chicago Press, 2003), 409; Andrew C. Thompson, "Logical Nonconformity? Conscientious Objection in the Cambridge Free Churches After 1914," Journal of United Reformed Church History Society 5, no. 9 (November 1996): 551.
- [3] "would mean that gravitation": Eddington, "Some Problems," 98.
- [4] "There is the problem": Leo Corry, "The Origin of Hilbert's Axiomatic Method," in *The Genesis of General Relativity*, vol. 4, ed. Jürgen Renn (Dordrecht: Springer, 2007), 771.
- [5] Hilbert had refused: Albrecht Fölsing, Albert Einstein: A Biography (New York: Viking, 1997), 364; CPAE volume 8, document 101, "Einstein to Heinrich Zangger between 24 July and 7 August 1915," 115–16.

- [6] **"Berlin is no match":** CPAE volume 8, document 94, "Einstein to Heinrich Zangger, 7 July 1915," 110.
- [7] "clarified very much": Fölsing, Albert Einstein, 364.
- [8] With a verbal shrug: Ibid., 365.
- [9] "Hilbert now regrets": CPAE volume 8, document 94, "Einstein to Heinrich Zangger, 7 July 1915," 110.
- [10] A planning meeting: Hubert Goenner and Giuseppe Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," Science in Context 9, no. 4 (December 1996): 342.
- [11] Surely there must be: CPAE volume 8, document 98, "Einstein to Hendrik A. Lorentz, 21 July 1915," 113.
- [12] **The powerful would forever:** CPAE volume 8, document 103, "Einstein to Hendrik A. Lorentz, 2 August 1915," 117.
- [13] "no education and intellectual": CPAE volume 8, document 101, "Einstein to Heinrich Zangger, between 24 July and 7 August 1915," 115.
- [14] By the fall: Thomas Levenson, Einstein in Berlin (New York: Bantam Books, 2003), 142.
- [15] Elsa had been cooking: CPAE volume 8, document 94, "Einstein to Heinrich Zangger, 7 July 1915," 110.
- [16] The German High Command: Elizabeth Fordham, "Universities," in Capital Cities at War, vol. 2, eds. Jay Winter and Jean-Louis Robert (Cambridge: Cambridge University Press, 1997), 252.
- [17] A replica of a front-line trench: Levenson, Einstein in Berlin, 118.
- [18] **Einstein hoped that Germany:** Goenner and Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," 340.
- [19] This was aggravated by: See CPAE volume 8A, 166 and 277.
- [20] "Milk and honey": CPAE volume 8, document 115, "Einstein to Elsa Einstein, 3 September 1915," 125.
- [21] Besso helped mediate: CPAE volume 8, document 133, "From Michele Besso to Einstein, 30 October 1915," 139–40.
- [22] "very vivacious and serene": Rolland's diary, quoted in Fölsing, Albert Einstein, 349.
- [23] "It is being harassed": CPAE volume 8, document 118, "Einstein to Romain Rolland, 15 September 1915," 127.
- [24] **Humiliatingly, a soldier:** CPAE volume 8, document 120, "Einstein to Heinrich Zangger, 19 September 1915," 129.
- [25] "Nature always uses": Memoirs of the Royal Academy of Sciences at Paris, (April 15, 1744), 417–26.
- [26] **He immediately sat down:** CPAE volume 8, document 122, "Einstein to Hendrik A. Lorentz, 23 September 1915," 131.
- [27] **But in retracing:** Michel Janssen and Jürgen Renn, "Arch and Scaffold: How Einstein Found His Field Equations," *Physics Today* 68 (2015): 30–36; Michel Janssen and Jürgen Renn, "Einstein Was No Lone Genius," *Nature* 527, no. 7578 (November 2015): 298–300.
- [28] "electrifies me enormously": CPAE volume 8, document 123, "Einstein to Erwin Freundlich, 30 September 1915," 132.

- [29] "I must depend": CPAE volume 8, document 123, "Einstein to Erwin Freundlich, 30 September 1915," 132.
- [30] In early October: Jürgen Renn and Tilman Sauer, "Pathways Out of Classical Physics," in *The Genesis of General Relativity* vol. 1, ed. Jürgen Renn (Dordrecht: Springer, 2007), 113–312.
- [31] He agreed to do so: Goenner and Castagnetti, "Albert Einstein as Pacifist," 346.
- [32] "animal hatred": Ibid., 348.
- [33] He called for: Fölsing, Albert Einstein, 367.
- [34] "unscrupulous opportunist": Albert Einstein, "Remarks Concerning the Essays Brought Together in This Co-Operative Volume," in Albert Einstein: Philosopher-Scientist, ed. Paul Arthur Schlipp (Evanston, IL: The Library of Living Philosophers, 1949), 683–84.
- [35] **He described how:** Fölsing, *Albert Einstein*, 372.
- [36] "I have immortalized": CPAE volume 8, document 153, "Einstein to Arnold Sommerfeld, 28 November 1915," 152.
- [37] This certainly made for: Michel Janssen and Jürgen Renn, "Untying the Knot," *The Genesis of General Relativity* vol. 2, ed. Jürgen Renn (Dordrecht: Springer, 2007), 850–51.
- [38] "In the last few days": CPAE volume 8, document 134, "Einstein to Hans Albert Einstein, 4 November 1915," 140.
- [39] "I am curious": CPAE volume 8, document 136, "Einstein to David Hilbert, 7 November 1915," 141.
- [40] "the glorification of war": CPAE volume 8, document 138, "Einstein to Berliner Goethebund, 11 November 1915," 143.
- [41] **Einstein particularly noted:** CPAE volume 8, document 139, "Einstein to David Hilbert, 12 November 1915," 143.
- [42] **He would be happy:** CPAE volume 8, document 140, "Hilbert to Einstein, 13 November 1915," 144.
- [43] **He asked Hilbert:** CPAE volume 8, document 144, "Einstein to David Hilbert, 15 November 1915," 145–46.
- [44] His calculation said: Renn and Sauer, "Pathways," 280.
- [45] "Imagine my joy": CPAE volume 8 (listed in volume 10), document 144a, "Einstein to Heinrich Zangger, 15 November 1915," 19.
- [46] In these last months: CPAE volume 8, document 147, "Einstein to Michele Besso, 17 November 1915," 148.
- [47] "Today I am presenting": CPAE volume 8, document 148, "Einstein to David Hilbert, 18 November 1915," 148.
- [48] **Einstein had the advantage:** CPAE volume 8, document 149, "From David Hilbert to Einstein, 19 November 1915," 149.
- [49] This was probably because: Renn and Sauer, "Pathways," 280.
- [50] "I was beside myself": CPAE volume 8, document 182, "Einstein to Paul Ehrenfest, 17 January 1916," 179.
- [51] "The theory is beautiful": CPAE volume 8, document 152, "Einstein to Heinrich Zangger, 26 November 1915," 151.
- [52] Hilbert credited Einstein: Jürgen Renn and John Stachel, "Hilbert's Foundation of Physics" in Renn, Genesis vol. 4, 911.

- [53] Another large part: Ibid., 857.
- [54] "In my personal experience": CPAE volume 8, document 152, "Einstein to Heinrich Zangger, 26 November 1915," 151.
- [55] Hilbert quickly realized: Renn and Stachel, "Hilbert's Foundation of Physics," 911.
- [56] **There has been a certain ill-feeling:** CPAE volume 8, document 167, "Einstein to David Hilbert, 20 December 1915," 163.
- [57] "rather fishy": Matthias Schemmel, "The Continuity Between Classical and Relativistic Cosmology in the Work of Karl Schwarzschild," in *The Genesis of General Relativity* vol. 3, ed. Jürgen Renn (Dordrecht: Springer, 2007), 167.
- [58] "agreement of two single numbers": Schemmel, "Continuity," 168.
- [59] "As you read": CPAE volume 8, document 161, "Einstein to Arnold Sommerfeld, 9 December 1915," 159.
- [60] "trying to poke holes": CPAE volume 10 (cited as volume 8), document 159a, "Einstein to Heinrich Zangger, 4 December 1915," 20.
- [61] He wanted something new: CPAE volume 8, document 165, "Einstein to Moritz Schlick, 14 December 1915," 161–62.
- [62] **He was planning a visit:** CPAE volume 8, document 168, "Einstein to Michele Besso. 21 December 1915," 163.
- [63] He did not mention: Ibid.

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- [1] "chain of wrong tracks": CPAE volume 8, document 183, "Einstein to Hendrik A. Lorentz, 17 January 1916," 179.
- [2] "walk around without a muzzle": CPAE volume 8, document 177, "Einstein to Hendrik A. Lorentz, 1 January 1916," 170.
- [3] **"abominable":** CPAE volume 8, document 183, "Einstein to Hendrik A. Lorentz, 17 January 1916," 179–81.
- [4] **One of Einstein's Íriends:** CPAE volume 8, document 247, "Gunnar Nordström to Einstein, 3 August 1916," 241.
- [5] The fighting felt close: Martin J. Klein, Paul Ehrenfest, Volume I: The Making of a Theoretical Physicist (New York: Elsevier Science, 1970), 298.
- [6] "a supporter of the peace movement": Hubert Goenner and Giuseppe Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," Science in Context 9. no. 4 (December 1996): 372.
- [7] Surely the war: Albrecht Fölsing, Albert Einstein: A Biography (New York: Viking, 1997), 396.
- [8] "As you see": CPAE volume 8, document 169, "From Karl Schwarzschild to Einstein, 22 December 1915," 164.
- [9] "the question of light deflection": CPAE volume 8, document 176, "Einstein to Karl Schwarzschild, 29 December 1915," 170.
- [10] "enjoyed and admired": Andrew Warwick, Masters of Theory: Cambridge and the Rise of Mathematical Physics (Chicago: University of Chicago Press, 2003), 476–77.
- [11] "is why I would regret": CPAE volume 8, document 181, "Einstein to Karl Schwarzschild, 9 January 1916," 177.

- [12] "foiled assault": CPAE volume 8, document 186, "Einstein to Arnold Sommerfeld, 2 February 1916," 188; CPAE volume 8, document 207, "Einstein to David Hilbert, 30 March 1916," 205–6.
- [13] "We regard": Report of the 1915 Yearly Meeting, quoted in John W. Graham, Conscription and Conscience (London: Allen & Unwin, 1922), 162.
- [14] **They were formed:** James McDermott, *British Military Service Tribunals* 1916–1918 (Manchester: Manchester University Press, 2011), 16.
- [15] **Some 1.2 million:** Ibid., 24.
- [16] The Banbury Local Tribunal: Adrian Gregory, The Last Great War (Cambridge: Cambridge University Press, 2008), 101–2.
- [17] "He will carry": J. D. Symon, *The Universities' Part in the War*, pamphlet (n.p., 1915), Cambridgeshire Public Library C 45.5, 727–28.
- [18] "The melancholy of this place": Quoted in Stuart Wallace, War and the Image of Germany: British Academics, 1914–1918 (Edinburgh: John Donald Publishing, 1988), 74.
- [19] "refused to sheathe": Cambridge Magazine, March 4, 1916, 359.
- [20] While an undergraduate: Warwick, Masters of Theory, 451.
- [21] "Hitherto I had": Eddington to de Sitter, June 11, 1916, Leiden UB, AFA FC WdS 14, Leiden University Library, Leiden Observatory Archives, directorate Willem de Sitter. Hereafter WdS.
- [22] "I am immensely interested": Ibid.
- [23] "So far as I can": Eddington to de Sitter, July 4, 1916, WdS.
- [24] "I was interested to hear": Eddington to de Sitter, October 13, 1916, WdS.
- [25] **"Your theory still seems":** CPAE volume 8, document 243, "From Willem de Sitter to Einstein, 27 July 1916," 239.
- [26] "It is a fine thing": CPAE volume 8, document 290, "From Einstein to Willem de Sitter, 23 January 1917," 279–80.
- [27] **His general absentmindedness:** Alice Calaprice, ed., *The Ultimate Quotable Einstein* (Princeton: Princeton University Press, 2010), 30.
- [28] "very thorough": CPAE volume 8, document 209a, "Einstein to Elsa Einstein, from Zurich, 6 April 1916," 22.
- [29] **Einstein's plan:** For example, see CPAE volume 8, document 211, "Einstein to Mileva Einstein-Marić, 8 April 1916," 208–9.
- [30] She was also increasingly ill: Fölsing, Albert Einstein, 395.
- [31] **But our enemies:** William Van der Kloot, *Great Scientists Wage the Great War* (Oxford: Fonthill Books, 2014), 194.
- [32] The soap shortage: Roger Chickering, The Great War and Urban Life in Germany: Freiburg, 1914–1918, Studies in the Social and Cultural History of Modern Warfare 24 (Cambridge: Cambridge University Press, 2007), 295–307.
- [33] **"my aesthetic demands":** CPAE volume 8, document 247a, "Einstein to Heinrich Zangger, 3 August 1916," 27.
- [34] "I shut my eyes": CPAE volume 8, document 232a, "Einstein to Heinrich Zangger, 11 July 1916," 24.
- [35] Unable to continue: Goenner and Castagnetti, "Albert Einstein as Pacifist," 349, 353.
- [36] "people will lose faith": CPAE volume 8, document 264, "Einstein to Werner Weisbach, 14 October 1916," 253.

- [37] "state of siege": Jon Lawrence, "Public Space, Political Space," in Capital Cities at War: Paris, London, Berlin 1914–1919: A Cultural History, vol. 2, eds. Jay Winter and Jean-Louis Robert, Studies in the Social and Cultural History of Modern Warfare (Cambridge: Cambridge University Press, 1997), 288.
- [38] "among the living": CPAE volume 8, document 223, "Einstein to David Hilbert, 30 May 1916," 216.
- [39] "artistic pleasure from devising": CPAE volume 6, document 33, "Einstein's Memorial Lecture on Karl Schwarzschild," Victoria Yam, trans.
- [40] "He would have been a gem": CPAE volume 8, document 219, "Einstein to Michele Besso, 14 May 1916," 213.

第8章

- [1] **"We would rather say":** *The Observatory* 503 (August 1916): 337–39.
- [2] "Is not the die really cast": "From an Oxford Note-Book," *The Observatory* 500 (May 1916): 240.
- [3] **he praised Turner:** RAS MSS Grove Hills 1914, Arthur Eddington to Hills, 2/1 14, 27 January, Royal Astronomical Society, London.
- [4] "The dilemma is inexorable": J. H. Morgan, "German Atrocities: An Official Investigation," quoted in "From an Oxford Note-Book," *The Observatory* 500 (May 1916): 241–42.
- [5] "Above all, there is the conviction": A. S. Eddington, "The Future of International Science," *The Observatory* 501 (June 1916): 271.
- [6] Fortunately, most of us know: Ibid.
- [7] "Naturally I do not regard": Arthur Eddington to Joseph Larmor, June 7, 1916, MS/603, Larmor Papers, Royal Society.
- [8] "staring at a sunlit picture of Hell": Siegfried Sassoon, Memoirs of an Infantry Officer (London: Faber and Faber, 1930), 76.
- [9] Capt. W. P. Nevill: Martin Gilbert, A History of the Twentieth Century, Vol. 1: 1900–1933 (New York: William Morrow, 1997), 408–9; John Keegan, The First World War (New York: Vintage, 2000), 308–21.
- [10] **He casually lit:** J. M. Winter and Blaine Baggett, 1914–1918: The Great War and the Shaping of the 20th Century (London: BBC Books, 1996), 16.
- [11] "by candle light": Joseph Loconte, "How J.R.R. Tolkien Found Mordor on the Western Front," New York Times, June 30, 2016, https://www.nytimes .com/2016/07/03/opinion/sunday/how-jrr-tolkien-found-mordor-on-the -western-front.html, accessed August 16, 2018.
- [12] Is it not an actual fact: "From an Oxford Note-Book," *The Observatory* 502 (July 1916): 23–24.
- [13] "highly complicated in form": A. S. Eddington, "Gravitation and the Principle of Relativity," *Nature* 98 (2461), December 28, 1916, 328–30.
- [14] Eddington had hoped: The Observatory 503 (August 1916): 337–39.
- [15] "This is objective evidence": CPAE volume 8, document 278, "Einstein to Hermann Weyl, 23 November 1916," 265.
- [16] "After all, we are a university": Clark Kimberling, "Emmy Noether and Her Influence," in Emmy Noether, A Tribute to Her Life and Work, by Emmy Noether,

- ed. James W. Brewer and Martha K. Smith, Monographs and Textbooks in Pure and Applied Mathematics 69 (New York: Marcel Dekker Inc., 1982), 14.
- [17] "Upon receiving the new work": CPAE volume 8, document 677, "Einstein to Felix Klein, 27 December 1918," 714.
- [18] So his task was: CPAE volume 8, document 194, "Einstein to Karl Schwarzschild, 19 February 1916," 196; CPAE volume 8, document 226, "E to Hendrik A. Lorentz, 17 June 1916," 221; CPAE volume 8, document 227, "Einstein to Willem de Sitter, 22 June 1916," 223.
- [19] Many peace activists: CPAE volume 8, document 253, "Einstein to Paul Ehrenfest, 25 August 1916," 245.
- [20] "A long chain": CPAE volume 8, document 256, "Einstein to Paul Ehrenfest, 6 September 1916," 248.
- [21] "the concurrence in opinion": CPAE volume 8, document 276, "Einstein to Hendrik A. Lorentz, 13 November 1916," 263.
- [22] **His wife, Tatyana:** Martin J. Klein, *Paul Ehrenfest, Volume I: The Making of a Theoretical Physicist* (New York: Elsevier Science, 1970), 304.
- [23] It is not a coincidence: Andrew Warwick, Masters of Theory: Cambridge and the Rise of Mathematical Physics (Chicago: University of Chicago Press, 2003), 459–60.
- [24] the only person in Belgium: See CPAE volume 8, document 230, "Einstein to Théophile de Donder, 13 June 1916," 226; CPAE volume 8, document 231, "From Théophile de Donder to Einstein, 4 July 1916," 226.
- [25] "Einstein began to puff": Klein, Paul Ehrenfest, 303.
- [26] "a bit of give and take": Ibid.
- [27] "have to receive me lardless": CPAE volume 10 (cited as volume 8), document 262b, "Einstein to Elsa Einstein, 7 October 1916," 31.
- [28] "The reinvigorating days": CPAE volume 8, document 268, "Einstein to Paul and Tatyana Ehrenfest, 18 October 1916," 255.
- [29] "already come very much alive": CPAE volume 8, document 270, "Einstein to Michele Besso, 31 October 1916," 257.
- [30] **Einstein tried to recruit Planck:** CPAE volume 8, document 269, "Einstein to Paul Ehrenfest, 24 October 1916," 256.
- [31] "skittish": CPAE volume 8, document 276, "Einstein to Hendrik A. Lorentz, 13 November 1916," 263.
- [32] "very warmly": CPAE volume 8, document 275, "Einstein to Paul Ehrenfest, 7 November 1916," 263.
- [33] **This included Elsa's:** CPAE volume 9, document 277, "Einstein to Paul Ehrenfest, 17 November 1916," 265.
- [34] Anti-Semitic conspiracy: Belinda Davis, Home Fires Burning: Food, Politics, and Everyday Life in World War I Berlin (Chapel Hill: University of North Carolina Press, 2000), 135.
- [35] Mass food protests: Thomas Levenson, *Einstein in Berlin* (New York: Bantam Books, 2003), 143–44.
- [36] In reality, everything was made worse: Thierry Bonzon and Belinda Davis, "Feeding the Cities," in *Capital Cities at War: Paris, London, Berlin 1914–1919: A Cultural History*, vol. 1, eds. Jay Winter and Jean-Louis Robert, Studies in

- the Social and Cultural History of Modern Warfare (Cambridge: Cambridge University Press, 1997), 336.
- [37] "contrary to my most": CPAE volume 10 (cited as volume 8), document 287b, "Einstein to Heinrich Zangger, 16 January 1917," 39–40.
- [38] Most sausage available: Davis, Home Fires Burning, 206.
- [39] Ersatz sausage: Stefan Goebel, "Schools," in Capital Cities at War: Paris, London, Berlin 1914–1919: A Cultural History, vol. 2, eds. Jay Winter and Jean-Louis Robert, Studies in the Social and Cultural History of Modern Warfare (Cambridge: Cambridge University Press, 1997), 218.
- [40] His relatives in southern Germany: CPAE volume 10 (cited as volume 8), document 287b, "Einstein to Heinrich Zangger, 16 January 1917," 39–40.
- [41] Having food sent: Bonzon and Davis, "Feeding the Cities," 322.
- [42] **The situation in Berlin:** Catherine Rollet, "The Home and Family Life," in Winter and Robert, *Capital Cities at War*, 333.
- [43] "wrath of the evil spirits": CPAE volume 10 (cited as volume 8), document 287b, "Einstein to Heinrich Zangger, 16 January 1917," 40.
- [44] "sickly appearance": CPAE volume 8, document 298, "Einstein to Paul Ehrenfest, 14 February 1917," 285; CPAE volume 10 (cited as volume 8), document 308a, "Einstein to Heinrich Zangger, 10 March 1917," 45.
- [45] At least the pain was better: CPAE volume 10 (cited as volume 8), document 308a, "Einstein to Heinrich Zangger, 10 March 1917," 45.
- [46] "the limiting conditions in the infinite": Albrecht Fölsing, Albert Einstein: A Biography (New York: Viking, 1997), 387.
- [47] "If I am to believe": CPAE volume 8, document 272, "From Willem de Sitter to Einstein, 1 November 1916," 261.
- [48] "I am sorry for having placed": CPAE volume 8, document 273, "Einstein to Willem de Sitter, 4 November 1916," 261.
- [49] "The relative velocities": CPAE volume 6, document 43, "Cosmological Considerations in the General Theory of Relativity," 428.
- [50] "justified by our actual knowledge": Ibid., 432.
- [51] **As usual when he encountered:** CPAE volume 8, document 300, "Einstein to Erwin Freundlich, 18 February 1917 or later," 287.
- [52] "the eternal enigma-giver": CPAE volume 8, document 306, "Einstein to Michele Besso, 9 March 1917," 293.
- [53] "Jehovah did not found": CPAE volume 8, document 308, "Einstein to Michele Besso, after 9 March 1917," 296.
- [54] "rather outlandish": CPAE volume 8, document 293, "Einstein to Willem de Sitter, 2 February 1917," 281.
- [55] "exposes me a bit": CPAE volume 8, document 294, "Einstein to Paul Ehrenfest, 4 February 1917," 282.
- [56] "I argue as I do": CPAE volume 8, document 308, "Einstein to Michele Besso, after 9 March 1917," 296.
- [57] "Now I am no longer plagued": CPAE volume 8, document 311, "Einstein to Willem de Sitter, 12 March 1917," 301.
- [58] "Well, if you do not want": CPAE volume 8, document 312, "From Willem de Sitter to Einstein, 15 March 1917," 302.

- [59] "I do not concern myself": CPAE volume 8, document 313, "From Willem de Sitter to Einstein, 20 March 1917," 303.
- [60] "difference in creed": CPAE volume 8, document 325, "From Einstein to Willem de Sitter, 14 April 1917," 316; volume 8, document 327, "From Willem de Sitter to Einstein, 18 April 1917."
- [61] "probably torpedoed": CPAE volume 8, document 312, "From Willem de Sitter to Einstein, 15 March 1917," 302.
- [62] British grain supplies: Elizabeth Bruton and Paul Coleman, "Listening in the Dark," History and Technology: An International Journal 32, no. 3 (2016): 245.
- [63] "When I speak with people": CPAE volume 8, document 306, "Einstein to Michele Besso, 9 March 1917," 293.
- [64] The DFG was no more welcomed: Hubert Goenner and Giuseppe Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," Science in Context 9, no. 4 (December 1996): 355.
- [65] "This agitation is probably connected": CPAE volume 8, document 204, "Wilhelm Foerster to Einstein, 25 March 1916," 204.
- [66] "It is a pity": CPAE volume 8, document 294, "Einstein to Paul Ehrenfest, 4 February 1917," 282.

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- [1] her efforts to keep: Friedrich Herneck, *Einstein at Home*, trans. Josef Eisinger (New York: Prometheus Books, 2016), 118.
- [2] **"unbelievably loudly":** Alice Calaprice, ed., *The New Quotable Einstein* (Princeton: Princeton University Press, 2005), 346.
- [3] **"The grub is good":** Albrecht Fölsing, *Albert Einstein: A Biography* (New York: Viking, 1997), 410.
- [4] The envelope also included: CPAE volume 10 (cited as volume 8), document 359a, "Einstein to Elsa Einstein, 30 June 1917," 58.
- [5] In Zurich he excitedly wrote: CPAE volume 10 (cited as volume 8), doc 376c, "Einstein to Elsa Einstein, 31 August 1917," 79.
- [6] The military authorities decided: Hubert Goenner and Giuseppe Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," Science in Context 9, no. 4 (December 1996): 357.
- [7] **He warned them not to seal:** CPAE volume 10 (cited as volume 8), document 332a, "Einstein to Heinrich Zangger, 4 May 1917," 50.
- [8] As an unmarried man: CPAE volume 8, document 403, "Einstein to Heinrich Zangger, 6 December 1917," 412.
- [9] The middle of 1917 saw: Belinda Davis, Home Fires Burning: Food, Politics, and Everyday Life in World War I Berlin (Chapel Hill: University of North Carolina Press, 2000), 206.
- [10] Haber, Fischer, and Nernst worked: Guy Hartcup, The War of Invention: Scientific Developments, 1914–18 (London: Brassey's Defence Publishers, 1988), 36.
- [11] At one point: Davis, Home Fires Burning, 215.
- [12] When some forward-thinking: Ibid., 238.
- [13] "All our exalted technological progress": CPAE volume 8, document 403, "Einstein to Heinrich Zangger, 6 December 1917," 412.

- [14] he volunteered to run: Wolf Zuelzer, The Nicolai Case (Detroit: Wayne State University Press, 1982), 22.
- [15] As his internationalist views became: Ibid., 26-32.
- [16] He was fined 1,200 marks: Ibid., 178-79.
- [17] He kept pressing Einstein: CPAE volume 8, document 302, "From Georg Nicolai to Einstein, 26 February 1917," 288–90.
- [18] "Thus I raise my voice": CPAE volume 8, document 303, "Einstein to Georg Nicolai, 28 February 1917," 291.
- [19] **He immediately regretted:** CPAE volume 8, document 304, "Einstein to Georg Nicolai, 28 February 1917," 291.
- [20] Instead, Adler became: Peter Galison, "The Assassin of Relativity," in Einstein for the 21st Century, eds. Peter Galison, Gerald Holton, and Silvan Schweber (Princeton: Princeton University Press, 2008), 185–87.
- [21] Einstein quickly wrote a testimony: Ibid., 189-90.
- [22] In May 1917, Adler: Ibid., 190-95.
- [23] **Shopkeepers faced steep fines**: Adrian Gregory, *The Last Great War* (Cambridge: Cambridge University Press, 2008), 213.
- [24] There was a famous incident: C. S. Peel, How We Lived Then, 1914–1918: A Sketch of Social and Domestic Life in England During the War (London: Bodley Head, 1929), 98.
- [25] But tea?: Gregory, The Last Great War, 215.
- [26] "Send us chemists": Roy M. MacLeod, "The Chemists Go to War: The Mobilization of Civilian Chemists and the British War Effort, 1914–1918," Annals of Science 50 (1993): 473.
- [27] "chemical reserve": Ibid., 476–77.
- [28] That, he said, had been a disaster: Roy M. MacLeod, "Secrets Among Friends: The Research Information Service and the 'Special Relationship' in Allied Scientific Information and Intelligence, 1916–1918," Minerva 37 (1999): 212–14.
- [29] H. H. Turner had stopped: Dyson to Strömgren, 14 November 1917, Papers of Frank Dyson, Cambridge University Library, Royal Greenwich Observatory Archives, MS.RGO.8.150, cited by permission of the Syndics of Cambridge University Library. Hereafter DP.
- [30] French and American astronomers: Bureau de Longitudes to Dyson, 18 May 1917 and Unknown to Dyson 26 November 1917, DP.
- [31] One British astronomer supported: Plummer to Dyson, 26 July 1917, Papers of Frank Dyson, op. cit.
- [32] "I am very sensible": Dyson to Strömgren, 14 November 1917, Papers of Frank Dyson, op. cit.
- [33] "I hardly know whether": F. W. Dyson to Annie Jump Cannon, February 20,
 1915, Annie Jump Cannon Papers, Harvard University Archives HUGFP
 125.12 Box 2 HAIUPX. Courtesy of the Harvard University Archives.
- [34] "great evil with which": "Report of the Annual Meeting of the Association, Held on Wednesday October 30, 1918," Journal of the British Astronomical Association 29, no.1 (1918): 1.
- [35] "very skeptical about the theory": Arthur Eddington to Hermann Weyl, August 18, 1920, ETH-Bibliothek Zürich, Hochularchiv ETHZ, Hs 91: 523.
- [36] It proved to be a challenge: Andrew Warwick, Masters of Theory: Cambridge and the Rise of Mathematical Physics (Chicago: University of Chicago Press,

- 2003), 472; Eddington to Lodge, 7 August 1917; Alfred Lodge to Oliver Lodge, 18 August 1917; Eddington to Lodge, 8 December 1917, MS ADD 89 (Lodge Papers), UCL Library Services, Special Collections.
- [37] Eddington gently pointed out: Eddington to Lodge, 15 January 1918, MS ADD 89 (Lodge Papers), UCL Library Services, Special Collections.
- [38] Its yellow-brown clouds: L. F. Haber, *The Poisonous Cloud* (Oxford: Clarendon Press, 1986), 111.
- [39] It rarely killed: Ibid., 231.
- [40] This was three weeks of bombing: Phil Judkins, "Sound and Fury," in *History and Technology* 32, no. 3 (2016): 239.
- [41] The royal family: The London Gazette, July 17, 1917.
- [42] In the aftermath: Panayi, "Minorities," in Winter, The Cambridge History of the First World War, 223.
- [43] In view of the war: Lawrence Badash, "British and American Views of the German Menace in World War I," Notes and Records of the Royal Society of London 34, no. 1 (July 1979): 112.
- [44] "the good faith of the contracting parties": "From an Oxford Note-Book," The Observatory 524 (March 1918): 147.
- [45] "We have tried to think": Ibid., 128.
- [46] "plagiarism and piracy": Nature 102, no. 2571 (February 6, 1919): 446-47.
- [47] "stubborn, self-righteous": Paul Fussell, *The Great War and Modern Memory* (Oxford: Oxford University Press, 1975), 12.
- [48] Haig was both devoutly Christian: John Keegan, The First World War (New York: Vintage, 2000), 311.
- [49] Gas shells were bursting: Tim Cook, No Place to Run (Vancouver: UBC Press, 2001), 138.
- [50] "A big shell had just burst": "100 Years On, Relatives Gather to Remember Passchendaele's Fallen," The Guardian, July 31, 2017.
- [51] During Passchendaele, conscription: James McDermott, British Military Service Tribunals 1916–1918 (Manchester: Manchester University Press, 2011), 22–25.
- [52] "punched and pelted": Nicoletta F. Gullace, The Blood of Our Sons: Men, Women and the Renegotiation of British Citizenship During the Great War (New York: Palgrave Macmillan, 2002), 113.
- [53] "fire suddenly springs": A. Vibert Douglas, The Life of Arthur Stanley Eddington (London: Thomas Nelson, 1956), 69.
- [54] "impish satisfaction": Ibid., 110.
- [55] It could, and would, be checked: A. S. Eddington, Report on the Relativity Theory of Gravitation (London: Fleetway Press, 1918), v.
- [56] "Albert Einstein has provoked": A. S. Eddington, Space, Time, and Gravitation, 2nd ed. (Cambridge: Cambridge University Press, 1920), v.
- [57] "a strange race of men": Ibid., 23.
- [58] Gulliver regarded the Lilliputians: Ibid., 23-24.
- [59] "if man wishes": Eddington, Report, 53.
- [60] "the relativist is sometimes suspected": Eddington, Space, Time, and Gravitation, 27.
- [61] There was no Newtonian: Ibid., 67-68.
- [62] It is merely an image: Eddington, Report, 85.
- [63] "It suggests that only": Ibid., 87.

- [64] "Let us not be beguiled": Eddington, Space, Time, and Gravitation, 56.
- [65] **Doubting the fourth dimension:** This metaphor is developed in detail in Eddington, *Space, Time, and Gravitation*, 181.
- [66] "a complete history": Eddington, Report, 17.
- [67] "Pedantic criticism of": Ibid., 19.
- [68] "we may perhaps suspend": Ibid., 57.
- [69] If you could catch: Eddington, Space, Time, and Gravitation, 111.
- [70] "Whether the theory ultimately": Ibid., v.
- [71] "the purview of physics": Eddington, Report, xi.
- [72] Most people were still cautious: Nature 103, no. 2575 (March 6, 1919): 2.
- [73] **Regardless of skepticism:** For example, see "The Theory of Relativity," *American Mathematical Monthly* 28, no. 4 (April 1921): 175.
- $[\ 74\] \quad \hbox{``We consoled ourselves'': Peel,} \ \textit{How We Lived Then}, 94-96.$
- [75] Planck hovered constantly: Fölsing, Albert Einstein, 410–12.
- [76] the institute's meager funds: Ibid., 411.
- [77] "I do not believe in": CPAE volume 8, document 381, "Einstein to Michele Besso, 22 September 1917," 374.
- [78] **He speculated that the economic:** CPAE volume 10 (cited as volume 8), document 372a, "Einstein to Heinrich Zangger, 21 August 1917," 76.
- [79] "steered by hard facts": CPAE volume 8, document 374, "Einstein to Romain Rolland, 22 August 1917," 368.
- [80] **Perhaps suggesting one:** CPAE volume 8, document 376, "From Romain Rolland to Einstein, 23 August 1917," 371.
- [81] Einstein, as always valuing: CPAE volume 8, document 445, "From Fritz Haber to Einstein, 29 January 1918," 453, and CPAE volume 8, document 446, "Einstein to Fritz Haber, 29 January 1918," 454.
- [82] He had been living with Elsa: Fölsing, Albert Einstein, 418.
- [83] We don't know the details: CPAE volume 8, document 545, "From Ilse Einstein to Georg Nicolai, 22 May 1918," 564.
- [84] **He did not consider the whole episode:** Thomas Levenson, *Einstein in Berlin* (New York: Bantam Books, 2003), 154–56.
- [85] If Einstein were to be awarded: CPAE volume 8, document 449, "Einstein to Mileva Einstein-Marić, 31 January 1918," 456, and CPAE volume 10 (cited as volume 8), doc 475a, "From Mileva Einstein-Marić to Einstein, 5 March 1918." 89.
- [86] Planck then chided Einstein: CPAE volume 8, document 479, "From Max Planck to Einstein, 12 March 1918," 494.
- [87] This immediately resulted in: Fölsing, Albert Einstein, 417.
- [88] "The state of mind": CPAE volume 7, document 7, "Motives for Research," 1918, 42–45.
- [89] The supreme task: Ibid., 44.
- [90] He emphasized its boldness: Fölsing, Albert Einstein, 210–12.

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[1] "a 'slice of life'": Quoted in R. C. Sherriff, No Leading Lady (London: Victor Gollancz, 1968), 45.

- [2] What remains in my memory: J. E. Edmonds, Military Operations France and Belgium, 1918: Volume 1, The German March Offensive and Its Preliminaries (London: Imperial War Museum Department of Printed Books, 1995 [1935]), 470.
- [3] "We've no chance": "1918: Year of Victory," National Army Museum Online, https://www.nam.ac.uk/explore/1918-victory, accessed October 16, 2018.
- [4] "write encouragingly to friends": Paul Fussell, The Great War and Modern Memory (Oxford: Oxford University Press, 1975), 17.
- [5] **One serious problem was:** John Keegan, *The First World War* (London: Hutchinson, 1998), 433.
- [6] The Allies, however: Ibid., 437.
- [7] **The protesters were no longer:** Thomas Levenson, *Einstein in Berlin* (New York: Bantam Books, 2003), 180.
- [8] **Perhaps it could even:** CPAE volume 8, document 521, "Einstein to David Hilbert, before 27 April 1918," 540, and CPAE volume 8, document 522, "Einstein to David Hilbert, before 27 April 1918," 541.
- [9] **He wanted no one:** Albrecht Fölsing, *Albert Einstein: A Biography* (New York: Viking, 1997), 415.
- [10] It would only hurt: CPAE volume 8, document 530, "From David Hilbert to Einstein, 1 May 1918," 547.
- [11] "grave problems": CPAE volume 8, document 531, "From Ernst Troeltsch to Einstein, 1 May 1918," 548.
- [12] **He had wanted to:** CPAE volume 8, document 548, "Einstein to David Hilbert, 24 May 1918," 568.
- [13] "German work": Hubert Goenner and Giuseppe Castagnetti, "Albert Einstein as Pacifist and Democrat During World War I," *Science in Context* 9, no. 4 (December 1996): 367.
- [14] "by way of thinking": Ibid., 370.; CPAE volume 8, document 560, "Einstein to Adolf Kneser, 7 June 1918," 581.
- [15] **Ilse Einstein, seized by:** Wolf Zuelzer, *The Nicolai Case* (Detroit: Wayne State University Press, 1982), 230–32.
- [16] By summer 1918, Einstein: Belinda Davis, Home Fires Burning: Food, Politics, and Everyday Life in World War I Berlin (Chapel Hill: University of North Carolina Press, 2000), 21.
- [17] Hoping to spare Albert: CPAE volume 8, document 514, "Einstein to Heinrich Zangger, 22 April 1918," 535.
- [18] "the envy of all Berlin": CPAE volume 8, document 517, "Einstein to Auguste Hochberger, before 24 April 1918," 537.
- [19] Some part of him: CPAE volume 8, document 514, "Einstein to Heinrich Zangger, 22 April 1918," 535.
- [20] He joked to Max Born: Fölsing, Albert Einstein, 418.
- [21] This was at best: Ibid., 419.
- [22] **Pirates, it was thought:** Lord Walsingham, "German Naturalists and Nomenclature" *Nature* 102 (September 5, 1918): 4.
- [23] "honestly well disposed": Ibid.
- 24] Prussianism would dissappear: W. J. Holland, "Shall Writers upon the Biological Sciences Agree to Ignore Systematic Papers Published in the German Language Since 1914?" Science 48, no. 1245 (November 8, 1918).

- [25] "doubt the necessity": Robert M. Yerkes, ed., *The New World of Science: Its Development During the War* (New York: Scribner's, 1920), 409.
- [26] "bitter arguments": Ibid., 410.
- [27] There is nothing metaphysical: A. S. Eddington, Report on the Relativity Theory of Gravitation (London: Fleetway Press, 1918), 29.
- [28] "matter-of-fact": A. S. Eddington, "Einstein's Theory of Gravitation," *The Observatory* 510 (1917): 93.
- [29] If he could persuade: "Report of the Meeting of the Association Held on Wednesday, November 27, 1918" Journal of the British Astronomical Association 29, no. 2 (1918–1919): 36–37.
- [30] There was talk of eliminating: Peter Brock, Twentieth-Century Pacifism (London: Van Nostrand Reinhold Co., 1970), 16. See RSCM Vol. 11, 1914–1920, April 25, 1918, 304.
- [31] **In making application:** Observatory Syndicate Minutes, 1896–1971, March 12, 1918, UA Obsy A1 iii.
- [32] **Their presence was powerful:** James McDermott, *British Military Service Tribunals 1916–1918* (Manchester: Manchester University Press, 2011), 56.
- [33] in addition to questioning: Cambridge Daily News, March 6, 1916.
- [34] "You are exploiting God": John W. Graham, Conscription and Conscience (London: Allen & Unwin, 1922), 71.
- [35] "unpatriotic, a slacker, a weakling": W.H.W., "A Guide to the Conscientious Objector and the Tribunals," 6. Note that contemporary writers sometimes also used "CO" to stand for "commanding officer."
- [36] You have presumably heard: Cambridge Daily News, March 4, 1916.
- [37] **The Earl of Malmesbury:** Denis Hayes, *Conscription Conflict* (London: Sheppard Press, 1949), 208.
- [38] "Liberals, Socialists and Pacifists": Co-ordinating Committee for Research into the Use of the University for War, Cambridge University and War (Cambridge: unknown publisher [pamphlet]), 19. Hereafter CUW.
- [39] Things are coming near: CUW, 37-38.
- [40] Only then were they told: Hayes, Conscription Conflict, 260, and Graham, Conscription, 81; The No-Conscription Fellowship, "Two Years' Hard Labour for Refusing to Disobey the Dictates of Conscience" (London: NCF, [1918]), 70.
- [41] "the lot of that class": Graham, Conscription, 82.
- [42] Then, refusing to fight: Wormwood Scrubs was the destination of most imprisoned COs, to the point where the largest Quaker Meeting in London during the war was held inside the prison. Thomas Kennedy, *British Quakerism* 1860–1920 (Oxford: Oxford University Press, 2001), 349.
- [43] Once he finished his sentence: After the war, the government expressed some misgivings (though not publicly) about rearresting men for what was essentially the same offense. See TNA:PRO MH 47, "Report of the Central Tribunal Appointed Under the Military Service Act 1916" (London: H.M.S.O., 1919), 20.
- [44] Eddington personally transcribed: Minutes: Cambridge, Huntington and Lynn Monthly Meeting, January 9, 1918, R59/26/5/4. Courtesy of Cambridgeshire Archives.
- [45] I should explain first: Eddington to Lodge, 22 July 1918, MS ADD 89 (Lodge Papers), UCL Library Services, Special Collections.
- [46] The chairman briefly mentioned: Cambridge Daily News, June 14, 1918.

- [47] Unusually, they gave him: Cambridge Daily News, June 28, 1918.
- [48] This caused trouble for many: Cambridge Daily News, March 18, 1916.
- [49] Nonetheless, he wanted to be recognized: Niall Ferguson, The Pity of War (Basic Books, 1998), 186.
- [50] Sometimes COs simply stacked rocks: "Report of the Central Tribunal," 11-12. TNA: PRO MH 47. Participants with special or technical skills were supposed to be put to use in their fields. Apparently, this did not ever happen. See TNA:PRO MH 47/1, June 28, 1916.
- Some COs asked: Graham, Conscription, 232.
- [52] He would not abandon: S. Chandrasekhar, "The Richtmeyer Memorial Lecture—Some Historical Notes," American Journal of Physics 37, no. 6: 579-80. A similar version of the story is told in "Verifying the Theory of Relativity," in Notes and Records of the Royal Society of London, 1976, vol. 30, 249-60. [53] Eddington then left the hall: Cambridge Daily News, July 12, 1918.
- [54] The rate of typhoid: Leo van Bergen, "Military Medicine," in The Cambridge History of the First World War, vol. 3, ed. Jay Winter (Cambridge: Cambridge University Press, 2014), 303.
- [55] Half of the medical: Ibid., 301-6.
- [56] In February 1915: Jay Winter, "Shell Shock," in Winter, The Cambridge History of the First World War, 315.
- [57] Historians have pointed out: Anne Rasmussen, "The Spanish Flu," in Ibid., 337.
- [58] Military doctors tried: Ibid., 345-49.
- [59] "fashionable illness": Ibid., 335.
- [60] "There was no doubt": Ibid., 334.
- [61] In one month Einstein's Berlin: Levenson, Einstein in Berlin, 187.
- [62] Elsa had been taking lozenges: CPAE volume 9, document 7, "Einstein to Heinrich Zangger, 28 February 1919," 8.
- [63] The government now recommended: Levenson, Einstein in Berlin, 183–87.
- [64] A British soldier wrote: Dairy of Robert Cude, 8–9 August 1918. IWM CUDE R MM, 177. The National Archives, http://www.nationalarchives.gov.uk /pathways/firstworldwar/battles/counter.htm.
- I saw Wylie: "2010 Private Edward William Wylie," Australian Red Cross Society Wounded and Missing Enquiry Bureau Files 1DRL/0428, Australian War Memorial Research Centre.
- [66] The admiral in charge: Keegan, The First World War, 446.
- [67] Lenin sent agents: Levenson, Einstein in Berlin, 189.
- [68] On October 19: CPAE volume 8B, document 640, "From Max Planck to Einstein, 26 October 1918," footnote 1, 930-31.
- [69] "Think of the oath": CPAE volume 8, document 640, "From Max Planck to Einstein, 26 October 1918," 684.
- Planck, with whom Einstein: Suman Seth, Crafting the Quantum: Arnold Sommerfeld and the Practice of Theory, 1890-1926, Transformations: Studies in the History of Science and Technology (Cambridge, Massachusetts: MIT Press, 2010), 177; John Heilbron, The Dilemmas of an Upright Man: Max Planck as Spokesman for German Science (Berkeley: University of California
- [71] "canceled because of revolution": Fölsing, Albert Einstein, 421.

- [72] "Militarism and the privy-councilor": CPAE volume 8, document 652, "Einstein to Paul and Maja Winteler-Einstein, 11 November 1918," 693.
- [73] **His friends at the BNV:** Goenner and Castagnetti, "Albert Einstein as Pacifist," 361.
- [74] "I am enjoying": CPAE volume 8, document 663, "Einstein to Michele Besso, 4 December 1918," 703.
- [75] "the most precious asset": Goenner and Castagnetti, "Albert Einstein as Pacifist," 362.
- [76] "Force breeds only bitterness": CPAE volume 7, document 14, "On the Need for a National Assembly, 13 November 1918," 76.
- [77] **Democracy, he thought:** Goenner and Castagnetti, "Albert Einstein as Pacifist," 359.
- [78] We do not know exactly how much: Ibid., 362.
- [79] "We do not keep to": Ibid., 364.
- [80] This matched nicely: Ibid., 365.
- [81] Skirmishes in the streets: Levenson, Einstein in Berlin, 199.
- [82] In a letter to his sons: CPAE volume 8, document 667, "Einstein to Hans Albert and Eduard Einstein, 10 December 1918," 707.
- [83] On December 7: Levenson, Einstein in Berlin, 200.
- [84] "The military religion": CPAE volume 8, document 663, "Einstein to Michele Besso, 4 December 1918," 703.
- [85] "I find everything unspeakably dire": Seth, Crafting the Quantum, 178.
- [86] "of the firm conviction": CPAE volume 8, document 665, "Einstein to Arnold Sommerfeld, 6 December 1918," 705–6.
- [87] **The BNV held a meeting:** Goenner and Castagnetti, "Albert Einstein as Pacifist," 366.
- [88] Huge bonfires were lit: Elizabeth Fordham, "Universities," in Capital Cities at War, vol. 2, eds. Jay Winter and Jean-Louis Robert (Cambridge: Cambridge University Press, 1997), 307–8.
- [89] Suffering and unrest: Cambridge Friends Meeting Minutes November 1918, Cambridgeshire County Records R59/26/5/5.
- [90] "squeezing Germany until the pips squeak": The Times, November 24, 1918.
- [91] "misconduct": Graham, Conscription, 311.
- [92] **About seventy conscientious objectors:** Ibid., 322; Charles L. Mowat, *Britain Between the Wars* (Chicago: University of Chicago Press, 1955), 6.
- [93] They journeyed into far: Edward Thomas, *Quaker Adventures* (London: Fleming H. Revell, 1935), 1–22.
- [94] While chemists are testing: A. Ruth Fry, A Quaker Adventure (London: Nisbet and Co., 1926), 355.
- [95] "closely connected": Ibid., 330-31.

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- [1] "In journeying to observe": The Observatory 457 (January 1913): 62.
- [2] **He was frustrated both:** CPAE volume 9, document 10, "Einstein to Ehrenfest, 22 March 1919," 10.

- [3] Finally, he was ordered: Albrecht Fölsing, Albert Einstein: A Biography (New York: Viking, 1997), 424–25.
- [4] "well-fed citizens": CPAE volume 9, document 3, "Einstein to Hedwig and Max Born, 19 January 1919," 3.
- [5] **Unimpressed with the state of Germany:** CPAE volume 9, document 17, "Einstein to Pauline Einstein and Maja Winteler-Einstein, 4 April 1919," 15.
- [6] There wasn't much interest: Fölsing, *Albert Einstein*, 426.
- [7] **The conference officially opened:** Margaret MacMillan, *Paris 1919* (New York: Random House, 2002), 26, 46, 63.
- [8] Answering these questions: Alex Soojung-Kim Pang, Empire and the Sun: Victorian Solar Eclipse Expeditions (Stanford: Stanford University Press, 2002), 41.
- [9] Much of the information: Rory Mawhinney, "Astronomical Fieldwork and the Spaces of Relativity: The Historical Geographies of the 1919 British Eclipse Expeditions to Principe and Brazil," forthcoming in *Historical Geography*, 5.
- [10] Eddington would go to Principe: "Obituary Notices: Fellows: Cottingham, Edwin Turner," Monthly Notices of the Royal Astronomical Society 101: 131.
- [11] Cortie was known: "Obituary Notices: Fellows: Cortie, Aloysius L," Monthly Notices of the Royal Astronomical Society 86: 175.
- [12] Dyson trusted him implicitly: Richard Woolley, "Charles Rundle Davidson. 1875–1970," Biographical Memoirs of Fellows of the Royal Society, vol. 17 (November 1971), 193–94.
- [13] It had captured good fields: F. W. Dyson, A. S. Eddington, and C. Davidson, "A Determination of the Deflection of Light by the Sun's Gravitational Field, from Observations Made at the Total Eclipse of May 29, 1919," *Philosophical Transactions of the Royal Society of London Series A*, 220 (1920): 295.
- [14] Normally, overhauling them: RAS Papers 54, Council Minutes, Minutes of the JPEC Subcommittee, vol. 2, 14 June 1918.
- [15] "this in itself calls": The Observatory 537 (March 1919): 119–22.
- [16] Hoping to get: RAS Papers 54, Council Minutes, Minutes of the JPEC Subcommittee, vol. 1, 10 January 1919 and vol. 2, 14 February 1919.
- [17] "false trichotomy": John Earman and Clark Glymour, "Relativity and Eclipses: The British Eclipse Expeditions of 1919 and Their Predecessors," Historical Studies in the Physical Sciences 11, no. 1 (1980): 84; Alistair Sponsel, "Constructing a 'Revolution in Science': The Campaign to Promote a Favourable Reception for the 1919 Solar Eclipse Experiments," British Journal for the History of Science 35, no. 127 (December 2002): 442.
- [18] There were other possible: "RAS Meeting," *The Observatory* 526 (May 1918): 215.
- [19] "Eddington will go mad": A. S. Eddington, "Forty Years of Astronomy," in Joseph Needham, Background to Modern Science (Cambridge: The University Press, 1938), 117–44, 141–42, and A. Vibert Douglas, The Life of Arthur Stanley Eddington (London: Thomas Nelson, 1956), 40.
- [20] By summer they would: Sponsel, "Constructing a 'Revolution in Science," 444–47.
- [21] Berliner admitted that: CPAE volume 9, document 19, "From Arnold Berliner to Einstein, 9 April 1919," 17.

- [22] "free your laboratory": Lawrence Badash, "British and American Views of the German Menace in World War I," Notes and Records of the Royal Society of London 34, no. 1 (July 1979): 113.
- [23] **His son Erwin:** Fritz Stern, *Einstein's German World* (Princeton: Princeton University Press, 2001), 46–47.
- [24] "He is rooted to": CPAE volume 9, document 52, "Einstein to Heinrich Zangger, 1 June 1919," 44.
- [25] "The country is like": CPAE volume 9, document 16, "Einstein to Aurel Stodola, 31 March 1919," 15.
- [26] Of Booth's: Mawhinney, "Astronomical Fieldwork," 7.
- [27] This was some of the first: 11 March 1919, Eddington to Sarah Ann Eddington, EDDN A4/1, Eddington Papers, Trinity College Library, Cambridge.
- [28] "unlimited sugar": Ibid.
- [29] The ship stopped: 15–16 March 1919, Funchal, Eddington to Sarah Ann Eddington, EDDN A4/2, Eddington Papers, Trinity College Library, Cambridge.
- [30] He was instrumental: Mawhinney, "Astronomical Fieldwork," 8; E. Mota, P. Crawford, and A. Simoes, "Einstein in Portugal: Eddington's Expedition to Principe and the Reactions of Portuguese Astronomers," *The British Journal* for the History of Science 42, no. 2 (2009): 256.
- [31] Finally free of rationing: 15–16 March 1919, Funchal, Eddington to Sarah Ann Eddington, EDDN A4/2.; March 27, 1919, Funchal, Eddington to Sarah Ann Eddington, EDDN A4/3 Eddington Papers, Trinity College Library, Cambridge.
- [32] "as he was neither beautiful": 5 May 1919, Principe, Eddington to Winifred Eddington, EDDN A4/8, Eddington Papers, Trinity College Library, Cambridge.
- [33] only place to get proper tea: 27 March 1919, Funchal, Eddington to Sarah Ann Eddington, EDDN A4/3, Eddington Papers, Trinity College Library, Cambridge.
- [34] "I expect Mother": 5 May 1919, Principe, Eddington to Winifred Eddington, EDDN A4/8, Eddington Papers, Trinity College Library, Cambridge.
- [35] The other passengers: Katy Price, Loving Faster than Light: Romance and Readers in Einstein's Universe (Chicago: University of Chicago Press, 2012), 119.
- [36] Many of those companies: Catherine Higgs, Chocolate Islands: Cocoa, Slavery, and Colonial Africa (Athens, Ohio: Ohio University Press, 2012), 16; Carol Off. Bitter Chocolate (Toronto: Random House Canada, 2006), 49.
- [37] The Principe authorities: Higgs, Chocolate Islands, 143.
- [38] And as the light brightened: Ibid., 59.
- [39] They were met by both: Morize, "From Port to Planation," 14. RAS Papers 54, Council Minutes, Minutes of the JPEC Subcommittee, vol. 2, 14 June 1918 and vol. 2, 14 February 1919.
- [40] Police patrolled to keep: Morize, "From Port to Plantation," 15.
- [41] Most evenings the group: 29 April–2 May 1919, Eddington to Sarah Ann Eddington, EDDN A4/7, Eddington Papers, Trinity College Library, Cambridge.

- [42] **Eddington and Cottingham:** Mota, Crawford, and Simoes, "Einstein in Portugal," 258.
- [43] The plantation owner: 29 April-2 May 1919, Eddington to Sarah Ann Eddington, EDDN A4/7, Eddington Papers, Trinity College Library, Cambridge.
- [44] "It was a very fine sight": Higgs, Chocolate Islands, 61.; 29 April–2 May 1919, Eddington to Sarah Ann Eddington, EDDN A4/7, Eddington Papers, Trinity College Library, Cambridge.
- [45] He asked after Punch: 5 May 1919, Principe, Eddington to Winifred Eddington, EDDN A4/8, Eddington Papers, Trinity College Library, Cambridge.
- [46] Arthur Schuster: Pang, Empire and the Sun, 69.
- [47] In a superstitious age: A. S. Eddington, Space, Time, and Gravitation, 2nd ed. (Cambridge: Cambridge University Press, 1920), 113.
- [48] "the most perfect discipline": Pang, Empire and the Sun, 75.
- [49] A small observatory: Cambridge University Library, Royal Greenwich Observatory Archives MS.RGO.8.150.
- [50] But they rapidly diminished: Dyson, Eddington, and Davidson, "A Determination of the Deflection of Light by the Sun's Gravitational Field," 299.
- [51] "Eclipse splendid": The Observatory 540 (June 1919): 256.
- [52] "were a few gleams": 21 June and 2 July 1919, Eddington to Sarah Ann Eddington, EDDN A4/9, Eddington Papers, Trinity College Library, Cambridge.
- [53] "almost took away": Eddington, "Forty Years," 141.
- [54] "almost painful": Pang, Empire and the Sun, 72.
- [55] At that moment the astronomers: 14 July x 30 October 1919, "Account of an Expedition to Principe," A. S. Eddington, EDDN C1/3, Eddington Papers, Trinity College Library, Cambridge.
- [56] "We had to carry out": 21 June and 2 July 1919, Eddington to Sarah Ann Eddington, EDDN A4/9, Eddington Papers, Trinity College Library, Cambridge.
- [57] **He had to pause:** Dyson, Eddington, and Davidson, "A Determination of the Deflection of Light by the Sun's Gravitational Field," 314.
- [58] There is a marvelous spectacle: Eddington, Space, Time, and Gravitation, 115.
- [59] "Through cloud. Hopeful.": The Observatory 540 (June 1919): 256.
- [60] "not entirely from impatience": Eddington, "Forty Years," 142.
- [61] May 30, 3 am: Dyson, Eddington, and Davidson, "A Determination of the Deflection of Light by the Sun's Gravitational Field," 309.
- [62] We took 16 photographs: 21 June 1919, Eddington to Sarah Ann Eddington, EDDN A4/9, Eddington Papers, Trinity College Library, Cambridge.
- [63] "large as astronomical measures go": Eddington, "Forty Years," 142.
- [64] consequently I have: 21 June 1919, Eddington to Sarah Ann Eddington, EDDN A4/9, Eddington Papers, Trinity College Library, Cambridge.
- [65] "I knew that Einstein's theory": Eddington, "Forty Years," 142.
- [66] He called this: Douglas, Arthur Stanley Eddington, 40-41.
- [67] "Cottingham, you won't have": Ibid., 40.

- [68] He would likely arrive: 21 June 1919, Eddington to Sarah Ann Eddington, EDDN A4/9, Eddington Papers, Trinity College Library, Cambridge.
- [69] She had successfully: Fölsing, Albert Einstein, 427.
- [70] No one was allowed: Ibid., 427-28.
- [71] He would often work: Abraham Pais, Subtle Is the Lord: The Science and Life of Albert Einstein (Oxford: Oxford University Press, 1982), 301.
- [72] He had heard via: Fölsing, Albert Einstein, 438.
- [73] Their army would be shrunk: MacMillan, Paris 1919, 158.
- [74] "We will search their pockets": Ibid., 189.
- [75] Disgusted, he resigned: Ibid., 182; Jay Winter and Antoine Prost, The Great War in History: Debates and Controversies, 1914 to the Present, Studies in the Social and Cultural History of Modern Warfare 21 (Cambridge: Cambridge University Press, 2005), 41.
- [76] "Just as well that": Thomas Levenson, Einstein in Berlin (New York: Bantam Books, 2003), 242.
- [77] "Here the political wave": CPAE volume 9, document 52, "Einstein to Heinrich Zangger, 1 June 1919," 43–44.
- [78] He continued to try: CPAE volume 9, document 76, "From Hendrik A. Lorentz to Einstein, 26 July 1919," 64–65, and CPAE volume 9, document 108, "Einstein to Lorentz, 21 September 1919," 92–93.
- [79] "We do not forget": The Observatory 542 (August 1919): 297.
- [80] "We look back at that meeting": Ibid., 301.
- [81] Curtis measured the plates: Ibid., 298.
- [82] "some evidence": Ibid., 299.
- [83] "It chances that certain astronomers": Ibid., 306.
- [84] They saw themselves as inaugurating: Brigitte Schroeder-Gudehus, "Challenge to Transnational Loyalties: International Scientific Organizations after the First World War," Science Studies 3, no. 2 (April 1973): 93–118.
- [85] "Our grand governess": Daniel J. Kevles, "Into Hostile Political Camps," Isis 62, no. 1 (1971): 57–59.
- [86] Davidson worked with: Daniel Kennefick, "Not Only Because of Theory: Dyson, Eddington, and the Competing Myths of the 1919 Eclipse Expedition," in Einstein and the Changing Worldviews of Physics, ed. Christopher Lehner (Boston: Birkhäuser, 2012), 201–32.
- [87] Einstein's predicted deflection: Dyson, Eddington, and Davidson, "A Determination of the Deflection of Light by the Sun's Gravitational Field," 320–28.
- [88] Measuring those provided: Ibid., 299–309.
- [89] "I am glad": Eddington to Dyson, 3 October, 1919, Papers of Frank Dyson, MS.RGO.8/150/138.
- [90] I do not like: Eddington to Dyson, 21 October 1919, Papers of Frank Dyson, MS.RGO.8/150/143.
- [91] "They disclose something": Sponsel, "Constructing a 'Revolution in Science,'" 445.
- [92] **Other scientists proposed:** "Astronomy at the British Association," *The Observatory* (October 1919): 363–65.

- [93] Perhaps most important: Sponsel, "Constructing a 'Revolution in Science," 456–57.
- [94] **He reported back:** CPAE volume 9, document 127, "From Hendrik A. Lorentz to Einstein, 7 October 1919," 109.
- [95] **"Eddington found stellar shift"**: CPAE volume 9, document 110, "From Hendrik A. Lorentz to Einstein, 22 September 1919," 95.
- [96] Full of enthusiasm: Ilse Rosenthal-Schneider, Reality and Scientific Truth: Discussions with Einstein, Von Laue, and Planck (Detroit: Wayne State University Press, 1980). Another version can be found in Ilse Rosenthal-Schneider, "Albert Einstein 14 March 1879–18 April 1955," Australian Journal of Science (August 1955): 19.
- [97] "I knew I was right": Levenson, Einstein in Berlin, 215.
- [98] In another version: Alice Calaprice, ed., The Ultimate Quotable Einstein (Princeton: Princeton University Press, 2010), 94.
- [99] I cannot postpone: CPAE volume 9, document 113, "Einstein to Pauline Einstein, 27 September 1919," 98; volume 9, document 121, "Einstein to Max Planck, 4 October 1919," 105.
- [100] "congratulate you heartily": CPAE volume 9, document 185, "From Willem de Sitter to Einstein, 1 December 1919," 158.
- [101] "This is certainly one": CPAE volume 9, document 127, "From Hendrik A. Lorentz to Einstein, 7 October 1919," 109.
- [102] Ehrenfest hoped to get: CPAE volume 9, document 123, "From Paul Ehrenfest to Einstein, 5 October 1919," 106–7.
- [103] **Einstein immediately sent:** CPAE volume 7, document 23, "A Test of the General Theory of Relativity," 97, dated October 9, 1919, published October 10, 1919, in *Die Naturwissenschaften* 7 (1919): 776.
- [104] **All doubts have now been spent:** CPAE volume 9, document 131, "From the Zurich Physics Colloquium, 11 October 1919," 113.
- [105] **Einstein's responding verse:** CPAE volume 9, document 139, "Einstein to the Zurich Physics Colloquium, 16 October 1919," 118.
- [106] "So all is going better": CPAE volume 9, document 148, "From Heinrich Zangger to Einstein, 22 October 1919," 126–28.
- [107] This evening at the colloquium: CPAE volume 9, document 149, "Einstein to Max Planck, 23 October 1919," 128.
- [108] "How hard this magnificent": CPAE volume 9, document 160, "Einstein to Paul Ehrenfest, 8 November 1919," 136.
- [109] "The result is now definite": CPAE volume 9, document 151, "Einstein to Pauline Einstein, 26 October 1919," 130.
- [110] "My theory has been verified": CPAE volume 10 (cited as volume 9), document 148b, "Einstein to Elsa Einstein, 23 October 1919," 138.
- [111] Alistair Sponsel estimates: Sponsel, "Constructing a 'Revolution in Science,'" 460.
- [112] The whole atmosphere of tense interest: A. N. Whitehead, Science and the Modern World (New York: Macmillan, 1947), 15.
- [113] "After a careful study": "Joint eclipse meeting of the Royal Society and the Royal Astronomical Society," *The Observatory* 42, no. 545 (November 1919): 391.

- [114] This meant one could say: Ibid., 393.
- [115] This is the most important result: Ibid., 394.
- [116] "The conclusion is so important": Ibid.
- [117] He asked if Eddington: Ibid., 395.
- [118] H. F. Newall acknowledged: Ibid., 396.
- [119] The discovery made at the eclipse expedition: Ibid., 397.
- [120] "Professor Eddington, you must be": As recalled in Subrahmanyan Chandrasekhar, Eddington: The Most Distinguished Astrophysicist of His Time (Cambridge: Cambridge University Press, 1983), 83.
- [121] It was written by: Sponsel, "Constructing a 'Revolution in Science," 463-64.
- [122] "During the war": The Times, November 8, 1919.
- [123] "besieged by inquiries": Ibid.
- [124] There was a genuine sense: CPAE volume 9, document 174, "From Adolf Friedrich Lindemann to Einstein, 23 November 1919," 145.
- [125] A patriot fiddler-composer: Punch, November 19, 1919, 422.
- [126] "hundreds were turned away": CPAE volume 9, document 186, "From Arthur S. Eddington to Einstein, 1 December 1919," 159.
- [127] "The theoretical researches": A. S. Eddington, "Einstein's Theory of Space and Time," Contemporary Review 116 (1919): 639.
- [128] We cheered the Eclipse Observers': "From an Oxford Note-Book," The Observatory 546 (December 1919): 456.
- [129] "astronomer-adventurer": Joshua Nall, "Constructing Canals on Mars: Event Astronomy and the Transmission of International Telegraphic News," *Isis* 108 (June 2017): 280–306, and Pang, *Empire and the Sun*, 52–53.
- [130] "The Great Result": "From an Oxford Note-Book," 452.
- [131] "It is said that Professor Eddington": Ibid., 453.
- [132] All England has been talking: CPAE volume 9, document 186, "From Arthur S. Eddington to Einstein, 1 December 1919," 158–59.
- [133] I have been kept very busy: Ibid.

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- [1] "People seem to forget": A. Vibert Douglas, The Life of Arthur Stanley Eddington (London: Thomas Nelson, 1956), 115.
- [2] **"but those who are familiar":** "From an Oxford Note-Book," *The Observatory* 546 (1920): 37–38.
- [3] "We may also find satisfaction": Ibid., 44.
- [4] A few people unhappy: Nature 104 (December 25, 1919): 412.
- [5] Most everyone wanted: F. Schlesinger to Dyson, 16 February 1920, Papers of Frank Dyson, MS.RGO.8/150/123.
- [6] Within a year or so: "From an Oxford Note-Book," The Observatory 560 (January 1921): 234–35. See Jeffrey Crelinsten, "William Wallace Campbell and the 'Einstein Problem': An Observational Astronomer Confronts the Theory of Relativity," Historical Studies in the Physical Sciences 14, no. 1 (1983): 1–91, and Jeffrey Crelinsten, Einstein's Jury (Princeton: Princeton University Press, 2006).

- [7] "the blind leading the blind": Douglas, Arthur Stanley Eddington, 42.
- [8] The historian Andrew Warwick: Andrew Warwick, Masters of Theory: Cambridge and the Rise of Mathematical Physics (Chicago: University of Chicago Press, 2003), 480–99.
- [9] "The thrill of seeing": Douglas, Arthur Stanley Eddington, 52.
- [10] **A slight man:** Ibid., 51.
- [11] "enriched with literary quality": Ibid., 107; Warwick, Masters of Theory, 482.
- [12] **He also found room:** Douglas, Arthur Stanley Eddington, 117–18.
- [13] Oh leave the wise: Ibid., 44.
- [14] "an expounder to the multitude": Ibid., 105.
- [15] A common theme: Marshall Missner, "Why Einstein Became Famous in America," *Social Studies of Science* 15, no. 2 (1985): 270.
- [16] Katy Price points out: Katy Price, Loving Faster than Light: Romance and Readers in Einstein's Universe (Chicago: University of Chicago Press, 2012), 18, and The Observatory 557 (October 1920): 375.
- [17] For some years past: Abraham Pais, Subtle Is the Lord: The Science and Life of Albert Einstein (Oxford: Oxford University Press, 1982), 310.
- [18] **Punch** presented: Price, Loving Faster than Light, 30, 40.
- [19] "little knot of experts": Ibid., 31; Missner, "Why Einstein Became Famous in America," 277.
- [20] Perhaps the next bit: Albrecht Fölsing, Albert Einstein: A Biography (New York: Viking, 1997), 447.
- [21] "a destroyer of time and space": Missner, "Why Einstein Became Famous in America." 271–72.
- [22] "They cheer me": Fölsing, Albert Einstein, 457.
- [23] **Virtually nothing but Einstein:** CPAE volume 9, document 182, "From Arnold Berliner to Einstein, 29 November 1919," 155–56.
- [24] "You are presented as": CPAE volume 9, document 174, "From Adolf Friedrich Lindemann to Einstein, 23 November 1919," 146.
- [25] After the lamentable breach: The Times, November 28, 1919.
- [26] He went back to Oxford: Heidi König, "General Relativity in the English-Speaking World: The Contributions of Henry L. Brose," Historical Records of Australian Science 17, no. 2 (December 2016): 2006.
- [27] "May I in closing": CPAE volume 9, document 177, "From Robert W. Lawson to Einstein, 26 November 1919," 152.
- [28] **He declined and recommended:** CPAE volume 9, document 185, "From Willem de Sitter to Einstein, 1 December 1919," 158.
- [29] Eddington's letters were in English: CPAE volume 9, document 186, "From Arthur S. Eddington to Einstein, 1 December 1919," 159; volume 9, document 216, "Einstein to Arthur S. Eddington, 15 December 1919," 184–85.
- [30] The time has come, said Eddington: Douglas, Arthur Stanley Eddington, 116–17.
- [31] In Germany he wasn't: Fölsing, Albert Einstein, 449.
- [32] a front-page article: Ibid., 452; Thomas Levenson, Einstein in Berlin (New York: Bantam Books, 2003), 219–20; David E. Rowe, "Einstein's Allies and Enemies: Debating Relativity in Germany, 1916–1920," in Interactions:

- Mathematics, Physics and Philosophy, 1860–1930, ed. Vincent F. Hendricks et al. (Dordrecht: Springer, 2006), 221.
- [33] For hundreds of thousands: Rowe, "Einstein's Allies and Enemies," 223.
- [34] "Einstein versus Newton!": CPAE volume 9, document 175, "Paul Ehrenfest to Einstein, 24 November 1919," 147.
- [35] "Galinka's little picture": CPAE volume 9, document 189, "Einstein to Paul Ehrenfest. 4 December 1919." 161–62.
- [36] "With all our hearts": Pais, Subtle Is the Lord, 306.
- [37] **Einstein used his new leverage:** CPAE volume 9, document 194, "Einstein to Konrad Haenisch, 6 December 1919," 165–66.
- [38] **He wrote to Besso:** CPAE volume 9, document 207, "Einstein to Michele Besso, 12 December 1919," 178.
- [39] **The latter worried himself sick:** CPAE volume 10 (cited as volume 8), document 152a, "Einstein to Elsa Einstein, 28 October 1919," 140.
- [40] "general, somewhat sensational": Suman Seth, Crafting the Quantum: Arnold Sommerfeld and the Practice of Theory, 1890–1926 (Cambridge, Massachusetts: MIT Press, 2010), 190.
- [41] **One of the first signs:** Fölsing, *Albert Einstein*, 451.
- [42] **Einstein began complaining about:** CPAE volume 9, document 198, "Einstein to Max Born, 8 December 1919," 169.
- [43] "harmonizes with every": Rowe, "Einstein's Allies and Enemies," 198.
- [44] "Due to the newspaper clamor": CPAE volume 9, document 233, "To Heinrich Zangger, 24 December 1919," 197.
- [45] "I'm giving a children's lecture": CPAE volume 10 (cited as volume 9), document 17, "Einstein to Elsa Einstein, 17 May 1920," 163.
- [46] "so bad that I can hardly breathe": Alan Friedman and Carol Donley, Einstein as Myth and Muse (Cambridge: Cambridge University Press, 1985), 11.
- [47] "Half the world": CPAE volume 10 (cited as volume 9), document 20, "From Elsa Einstein to Einstein, 20 May 1920," 165.
- [48] "The dog is very smart": Alice Calaprice, ed., *The Ultimate Quotable Einstein* (Princeton: Princeton University Press, 2010), 234.
- [49] By an application: Albert Einstein, "What Is the Theory of Relativity?" The Times, November 28, 1919.
- [50] "Since the light deflection": CPAE volume 9, document 242, "Einstein to Heinrich Zangger, 3 January 1920," 204–5.
- [51] He became famous: Levenson, Einstein in Berlin, 224-28.
- [52] When asked, he gave: Ibid., 221.
- [53] Being photogenic helped: Rowe, "Einstein's Allies and Enemies," 199.
- [54] "like an artist": Friedman and Donley, Einstein as Myth and Muse, 18.
- [55] There was certainly a sense: Rowe, "Einstein's Allies and Enemies," 222.
- [56] He was also happy: Fölsing, Albert Einstein, 457–58.
- [57] "Here there is nothing": CPAE volume 9, document 84, "Paul Ehrenfest to Einstein, September 8 1919," 84.
- [58] He had been isolated: Fritz Stern, Einstein's German World (Princeton: Princeton University Press, 2001), 125.
- [59] Soon, though, Haber dedicated: Ibid., 134.

- [60] After the war: L. F. Haber, The Poisonous Cloud (Oxford: Clarendon Press, 1986), 291–92.
- [61] "In a few centuries": Stern, Einstein's German World, 60.
- [62] "My political optimism": CPAE volume 9, document 187, "Einstein to Adriaan D. Fokker, 1 December 1919," 159.
- [63] "willing and able to provide": CPAE volume 7, document 41, "'On the Quaker relief effort', after 11 July 1920," 192.
- [64] The German government asked: CPAE volume 10, document 74, "From German Central Committee for Food Relief to Einstein, 9 July 1920, Re: Quaker relief," 207.
- [65] Whatever great political: CPAE volume 7, document 40, "Einstein to the German Central Committee for Foreign Relief, 11 July 1920," 191.
- [66] The most valuable contribution: CPAE volume 7, document 47, "On the contributions of intellectuals to international reconciliation," published after 29 September 1920, 201.
- [67] Scientists could repair: CPAE volume 7, document 69, "Impact of science on the development of pacifism" (before December 9, 1921), 488–91.
- [68] "Our English colleagues": CPAE volume 9, document 187, "Einstein to Adriaan D. Fokker, 1 December 1919," 159.
- [69] "The outcome of the English": CPAE volume 9, document 208, "Einstein to Willem de Sitter. 12 December 1919." 179.
- [70] "The English and Belgians": CPAE volume 12, document 87, "From Fritz Haber to Einstein, 9 March 1921," 70.
- [71] **"It even has to be said":** CPAE volume 12, document 88, "Einstein to Fritz Haber, 9 March 1921," 71.
- [72] "enemy countries": RAS Papers 2, Council Minutes, volume 11, 14 February 1919; 9 April 1920; 11 February 1921.
- [73] Planck tried to get: John Heilbron, The Dilemmas of an Upright Man: Max Planck as Spokesman for German Science (Berkeley: University of California Press, 1986), 89.
- [74] He did what he could: RAS Letters 1919, Arthur Eddington to Andrew Crommelin, 28 December; RAS Letters 1921, Arthur Eddington to W. H. Wesley, 30 January.
- [75] Einstein pitched in: CPAE volume 14 (cited as volume 7), document 36a, "An Exchange of Scientific Literature, between 24 March and 4 April 1920," 3; Neue Zürcher Zeitung, 4 April 1920; CPAE volume 10, document 26, "Einstein to Lorentz, 22 May 1920," 169.
- [76] an excellent target: Levenson, Einstein in Berlin, 246–50.
- [77] "a Jew with international views": CPAE volume 7, document 45, "My Response. On the Anti-Relativity Company,"197.
- [78] "mass suggestion": Rowe, "Einstein's Allies and Enemies," 217.
- [79] Einstein actually sneaked in: Ibid., 227; Fölsing, Albert Einstein, 460–62.
- [80] "This world is a strange madhouse": CPAE volume 10, document 148, "Einstein to Grossmann, 12 September 1920," 271.
- [81] The attacks on Prof. Einstein: Fölsing, Albert Einstein, 464.
- [82] "The role I play": CPAE volume 10, document 148, "Einstein to Marcel Grossmann, 12 September 1920," 271.

- [83] Flippantly, he compared: Levenson, Einstein in Berlin, 250.
- [84] He had little interest: CPAE volume 7, document 57, "How I Became a Zionist," 234; CPAE volume 10, document 238, "Einstein to Jewish Community of Berlin, 22 December 1920," 338.
- [85] "I believe that this undertaking": CPAE volume 9, document 207, "Einstein to Michele Besso, 12 December 1919," 178.
- [86] "One feels in one's bones": Pais, Subtle Is the Lord, 303.
- [87] The postwar collapse of the German mark: Fölsing, Albert Einstein, 475.
- [88] She needled him: CPAE volume 10, document 10, "Elsa Einstein to Einstein, 9 May 1920," 157.
- [89] "Admiration for the scientist": Fölsing, Albert Einstein, 479–85.
- [90] I hope to show my interest: Eddington to Strömgren. November 1919, quoted in Hertzsprung-Kapteyn, "J. C. Kapteyn," Space Science Reviews 64 (1993): 81.
- [91] **He tried to participate:** A. S. Eddington, "Das Strahlungsgleichgewicht der Sterne," *Zeitschrift für Physik* 7 (1921): 531. It is not clear who translated the article.
- [92] "This paper is intended": August 1921, Manuscript of "Radiative Equilibrium of the Stars," EDDN C1/2, Eddington Papers, Trinity College Library, Cambridge.
- [93] A month later it was: RAS Papers 2, Council Minutes, volume 11, 14 November 1919: 12 December 1919.
- [94] "the award of the Gold Medal": RAS Papers 2, Council Minutes, volume 11, 9 January 1920.
- [95] There was a strong implied: R. J. Tayler, ed., History of the Royal Astronomical Society, vol. 2 (Oxford: Blackwell Scientific Publications, 1987), 20.
- [96] I am sorry to say: Eddington to Einstein, January 21, 1920, AEA ALS 9-264.
- [97] I find it difficult: Ludlam to Einstein, January 23, 1920, AEA ALS 9-266.
- [98] "tragicomical": CPAE volume 9, document 293, "Einstein to Arthur S. Eddington, 2 February 1920," 245.
- [99] The war had just ended: S. Chandrasekhar, Truth and Beauty (Chicago: University of Chicago Press, 1987), 115.
- [100] "by his eloquence": Douglas, Arthur Stanley Eddington, 104.
- [101] "a place where miracles happen": Pais, Subtle Is the Lord, 305, 310; Fölsing, Albert Einstein, 456.
- [102] Einstein finally set foot: Ronald Clark, Einstein: The Life and Times (New York: World Publishing, 1971), 270.
- [103] "a few 'irreconcilables'": König, "General Relativity in the English-Speaking World," 188.
- [104] He gave lectures in German: Fölsing, Albert Einstein, 508.
- [105] Einstein either did not realize: Price, Loving Faster than Light, 35.
- [106] "takes its own course": Ibid., 37.
- [107] "a splendid chap": CPAE volume 14, document 127, "Einstein to Elsa Einstein, 1 October 1923," 123.
- [108] The Einstein scholar: John Stachel, "The Young Einstein," in Einstein from "B" to "Z" (Boston: Birkhäuser, 2002), 21.

エピローグ

- [1] Every generation has used: For examples see Stephen G. Brush, "Prediction and Theory Evaluation: The Case of Light Bending," Science 246 (1989): 1124–129; Deborah G. Mayo, Error and the Growth of Experimental Knowledge (Chicago: University of Chicago Press, 1996), 133–37, 278–93; and Robert Hudson, "Novelty and the 1919 Eclipse Experiments," Studies in the History and Philosophy of Modern Physics 34 (2003): 107–29.
- [2] **That drove him:** Karl Popper, "On Reason and the Open Society," *Encounter* 38, no. 5 (1972): 13.
- [3] "dazed": Roberta Corvi, An Introduction to the Thought of Karl Popper (New York: Routledge, 1996), 4.
- [4] "intellectual modesty": Richard Bailey, Education in the Open Society—Karl Popper and Schooling (New York: Routledge, 2000), 12.
- [5] "a scientific model": Malachi Haim Hacohen, Karl Popper: The Formative Years 1902–1945 (Cambridge: Cambridge University Press, 2000), 95.
- [6] "to make explicit certain points": Dario Antiseri, Popper's Vienna (Aurora, Colorado: Davies Group Publishers, 2006), 25.
- [7] Popper's falsificationism has become: Michael Gordin, "Myth 27: That a Clear Line of Demarcation Has Separated Science from Pseudoscience," in Newton's Apple and Other Myths About Science, ed. Ronald Numbers and Kostas Kampourakis (Cambridge, Massachusetts: Harvard University Press, 2015), 219–25.
- [8] "no point of rest in science": Popper, "On Reason and the Open Society," 17.
- [9] **The results strongly confirmed:** Jeffrey Crelinsten, *Einstein's Jury* (Princeton: Princeton University Press, 2006).
- [10] "partly because the world": Dennis William Sciama, The Physical Foundations of General Relativity (New York: Doubleday, 1969), 69.
- [11] "cooler reflection": C. W. Francis Everitt, "Experimental Tests of General Relativity: Past, Present and Future," in *Physics and Contemporary Needs*, vol. 4, ed. Riazuddin (New York: Springer, 1980), 533.
- [12] "Only Eddington's disarming way": Ibid., 534.
- [13] "their measurement had been": Stephen Hawking, A Brief History of Time (New York: Bantam, 1988), 32.
- [14] The new analysis gave: G. M. Harvey, "Gravitational Deflection of Light," The Observatory 99 (December 1979): 195–98.
- [15] Two astronomers wrote: P. A. Wayman and C. A. Murray, "Relativistic Light Deflections," *The Observatory* 109 (October 1989): 189–91.
- [16] "despair on the part": John Earman and Clark Glymour, "Relativity and Eclipses: The British Expeditions of 1919 and Their Predecessors," Historical Studies in the Physical Sciences 11 (1980): 49–85.
- [17] **Earman and Glymour's argument:** H. M. Collins and Trevor Pinch, *The Golem* (Cambridge: Cambridge University Press, 1993).
- [18] It was not just that Eddington was biased: Ibid., 27-56.
- [19] "science needs decisive moments": Ibid., 52.

- [20] Surely, he said, science: N. David Mermin, "What's Wrong with This Sustaining Myth?" *Physics Today* 49, no. 3 (March 1996): 11–13; N. David Mermin, "The Golemization of Relativity," *Physics Today* 49, no. 4 (April 1996): 11–13.
- [21] Context, he writes: Daniel Kennefick, "Testing Relativity from the 1919 Eclipse—A Question of Bias," *Physics Today* 62 (2009): 37–42, and Daniel Kennefick, "Not Only Because of Theory: Dyson, Eddington, and the Competing Myths of the 1919 Eclipse Expedition," in *Einstein and the Changing Worldviews of Physics*, ed. Christopher Lehner (Boston: Birkhäuser, 2012), 201–32.
- [22] **colleagues in astronomy:** Matthew Stanley, *Practical Mystic* (Chicago: University of Chicago Press, 2007), 122–23 and 268 n181.
- [23] "opportunely put an end": Eddington, "Sir Frank Dyson, 1868–1939," Royal Society Obituary Notices of Fellows 3 (1940), 167.
- [24] **On the Einstein centenary:** W. H. McCrea, "Einstein: Relations with the RAS," *Quarterly Journal of the Royal Astronomical Society* 20, no. 3 (1979): 251–60.
- [25] Hawking called them: Hawking, A Brief History, 32.
- [26] In our present time: Clifford Will, Was Einstein Right? (New York: Basic Books, 1993), 76.
- [27] The plaque is a celebration: Gisa Weszkalnys, "Principe Eclipsed," Anthropology Today 25, no. 5 (October 2009), 8–12. Also see Richard Ellis, Pedro Ferreira, Richard Massey, and Gisa Weszkalnys, "90 Years On—The 1919 Eclipse Expedition at Principe," Astronomy and Geophysics 50, no. 4 (August 2009): 412–15.