

Further Reading

I. WHAT IS LIFE?

- Anthony Aguirre, Brendan Foster and Zeeya Merali (eds.), *Wandering towards a Goal: How Can Mindless Mathematical Laws Give Rise to Aims and Intention?* (Springer, 2018)
- Philip Ball, 'How life (and death) spring from disorder', *Quanta*, 25 January 2017; <https://www.quantamagazine.org/the-computational-foundation-of-life-20170126/>
- Steven Benner, *Life, the Universe and the Scientific Method* (The FfAME Press, 2009)
- Paul Davies and Niels Gregersen (eds.), *Information and the Nature of Reality: From Physics to Metaphysics* (Cambridge University Press, 2010)
- Nick Lane, *The Vital Question: Energy, Evolution and the Origins of Complex Life* (Norton, 2015)
- Ilya Prigogine and Isabelle Stengers, *Order out of Chaos* (Heinemann, 1984)
- Erwin Schrödinger, *What is Life?* (Cambridge University Press, 1944; Canto edn, 2012)
- Sara Walker, Paul Davies and George Ellis (eds.), *From Matter to Life: Information and Causality* (Cambridge University Press, 2017)
- Carl Woese, 'A new biology for a new century', *Microbiology and Molecular Biology Reviews*, vol. 68, no. 2, 173–86 (2004)

2. ENTER THE DEMON

- Derek Abbott, 'Asymmetry and disorder: a decade of Parrondo's paradox', *Fluctuation and Noise Letters*, vol. 9, no. 1, 129–56 (2010)
- R. Dean Astumian and Imre Derényi, 'Fluctuation driven transport and models of molecular motors and pumps', *European Biophysics Journal*, vol. 27, 474–89 (1998)

FURTHER READING

- Peter Atkins, *The Laws of Thermodynamics: A Very Short Introduction* (Oxford University Press, 2010)
- Philip Ball, 'Bacteria replicate close to the physical limit of efficiency', *Nature*, 20 September 2012; <http://www.nature.com/news/bacteria-replicate-close-to-the-physical-limit-of-efficiency-1.11446>
- Charles H. Bennett, 'Notes on Landauer's principle, reversible computation and Maxwell's Demon', *Studies in History and Philosophy of Modern Physics*, vol. 34, 501–10 (2003)
- Philippe M. Binder and Antoine Danchin, 'Life's demons: information and order in biology', *European Molecular Biology Organization (EMBO) Reports*, vol. 12, no. 6, 495–9 (2011)
- S. Chen et al., 'Structural diversity of bacterial flagellar motors', *EMBO Journal*, 30 (14), 2972–81 (2011); doi: <http://dx.doi.org/10.1038/emboj.2011.186>
- Kensaku Chida et al., 'Power generator driven by Maxwell's demon', *Nature Communications*, 8:15301 (2017)
- Nathanaël Cottet et al., 'Observing a quantum Maxwell demon at work', *Proceedings of the National Academy of Sciences*, vol. 114, no. 29, 7561–4 (2017)
- Alexander R. Dunn and Andrew Price, 'Energetics and forces in living cells', *Physics Today*, vol. 68, no. 2, 27–32 (2015)
- George Dyson, *Turing's Cathedral: The Origins of the Digital Universe* (Vintage, 2012)
- Lin Edwards, 'Maxwell's demon demonstration turns information into energy', *PhysOrg.com*, 15 November 2010; <https://phys.org/news/2010-11-maxwell-demon-energy.html>
- Ian Ford, 'Maxwell's demon and the management of ignorance in stochastic thermodynamics', *Contemporary Physics*, vol. 57, no. 3, 309–30 (2016)
- Jennifer Frazer, 'Bacterial motors come in a dizzying array of models', *Scientific American*, 16 December 2014
- James Gleick, *The Information: A History, a Theory, a Flood* (HarperCollins, 2011)
- Gregory P. Harmer et al., 'Brownian ratchets and Parrondo's games', *Chaos*, 11, 705 (2001); doi: 10.1063/1.1395623
- Peter Hoffman, *Life's Ratchet* (Basic Books, 2012)
- , 'How molecular motors extract order from chaos', *Reports on Progress in Physics*, vol. 79, 032601 (2016)
- William Lanouette and Bela Silard, *Genius in the Shadows: A Biography of Leo Szilárd, the Man behind the Bomb* (University of Chicago Press, 1994)
- C. H. Lineweaver, P. C. W. Davies and M. Ruse (eds.), *Complexity and the Arrow of Time* (Cambridge University Press, 2013)

FURTHER READING

- Norman MacRae, *John von Neumann: The Scientific Genius Who Pioneered the Modern Computer, Game Theory, Nuclear Deterrence, and Much More* (American Mathematical Society; 2nd edn, 1999)
- J. P. S. Peterson et al., 'Experimental demonstration of information to energy conversion in a quantum system at the Landauer limit', *Proceedings of The Royal Society A*, vol. 472, issue 2188 (2016): 20150813
- Takahiro Sagawa, 'Thermodynamic and logical reversibilities revisited', *Journal of Statistical Mechanics* (2014); doi: 10.1088/1742-5468/2014/03/P03025
- Jimmy Soni and Rob Goodman, *A Mind at Play: How Claude Shannon Invented the Information Age* (Simon and Schuster, 2017)

3. THE LOGIC OF LIFE

- G rard Batail, *Information and Life* (Springer, 2014)
- Gregory Chaitin, *The Unknowable: Discrete Mathematics and Theoretical Computer Science* (Springer, 1999)
- Peter Csermely, 'The wisdom of networks: a general adaptation and learning mechanism of complex systems', *BioEssays*, 1700150 (2017)
- Deborah Gordon, *Ants at Work: How an Insect Society is Organized* (Free Press, 2011)
- Andrew Hodges, *Alan Turing: The Enigma: The Book that Inspired the Film 'The Imitation Game'* (Princeton University Press, 2014)
- Douglas Hofstadter, *G del, Escher, Bach: An Eternal Golden Braid* (Basic Books, 1979)
- Bernd-Olaf K ppers, *Information and the Origin of Life* (MIT Press, 1990)
- Janna Levin, *A Madman Dreams of Turing Machines* (Knopf, 2006)
- G. Longo et al., 'Is information a proper observable for biological organization?', *Progress in Biophysics and Molecular Biology*, vol. 109, 108-14 (2012)
- Denis Noble, *Dance to the Tune of Life: Biological Relativity* (Cambridge University Press, 2017)
- Paul Rendell, *Turing Machine Universality of the Game of Life: Emergence, Complexity and Computation* (Springer, 2015)
- Stephen Wolfram, *A New Kind of Science* (Wolfram Media, 2002)
- Hubert Yockey, *Information Theory, Evolution and the Origin of Life* (Cambridge University Press, 2005)

FURTHER READING

4. DARWINISM 2.0

- Nessa Carey, *The Epigenetics Revolution: How Modern Biology is Rewriting Our Understanding of Genetics, Disease and Inheritance* (Columbia University Press, 2013)
- Richard Dawkins, *The Selfish Gene* (Oxford University Press, 1976)
- Daniel Dennett, *Darwin's Dangerous Idea: Evolution and the Meaning of Life* (Simon and Schuster, 1995)
- Robin Hesketh, *Introduction to Cancer Biology* (Cambridge University Press, 2013)
- Eva Jablonka and Marion Lamb, *Evolution in Four Dimensions* (MIT Press, 2005)
- George Johnson, *The Cancer Chronicles: Unlocking Medicine's Deepest Mystery* (Vintage, 2014)
- Stuart Kauffman, *The Origin of Order: Self-organization and Selection in Evolution* (Oxford University Press, 1993)
- Lewis J. Kleinsmith, *Principles of Cancer Biology* (Pearson, 2005)
- Matthew Niteki (ed.), *Evolutionary Innovations* (University of Chicago Press, 1990)
- Massimo Pigliucci and Gerd B. Müller (eds.), *Evolution, the Extended Synthesis* (MIT Press, 2010)
- Trygve Tollefsbol (ed.), *Handbook of Epigenetics* (Academic Press, 2011)
- Andreas Wagner, *Arrival of the Fittest* (Current, 2014)
- Robert A. Weinberg, *The Biology of Cancer* (Garland Science, 2007)
- Edward Wilson, *The Meaning of Human Existence* (Liveright, 2015)

5. SPOOKY LIFE AND QUANTUM DEMONS

- Derek Abbott, Paul Davies and Arun Patti (eds.), *Quantum Aspects of Life* (Imperial College Press, 2008)
- Richard Feynman, 'Simulating physics with computers', *International Journal of Theoretical Physics*, vol. 21, nos. 6/7 (1982)
- Johnjoe McFadden and Jim Al-Khalili, *Life on the Edge: The Coming of Age of Quantum Biology* (Bantam Press, 2014)
- Masoud Mohseni, Yasser Omar, Gregory S. Engel and Martin B. Plenio (eds.), *Quantum Effects in Biology* (Cambridge University Press, 2014)
- Leonard Susskind and Art Friedman, *Quantum Mechanics: The Theoretical Minimum* (Basic Books, 2015)
- Peter G. Wolynes, 'Some quantum weirdness in physiology', *Proceedings of the National Academy of Sciences*, vol. 106, no. 41, 17247-8 (13 October 2009)

FURTHER READING

6. ALMOST A MIRACLE

- A. G. Cairns-Smith, *Seven Clues to the Origin of Life: A Scientific Detective Story* (Cambridge University Press, 1985)
- Matthew Cobb, *Life's Greatest Secret: The Race to Crack the Genetic Code* (Basic Books, 2015)
- Paul Davies, *The Fifth Miracle: The Search for the Origin of Life* (Allen Lane, 1998)
- Christian de Duve, *Vital Dust: The Origin and Evolution of Life on Earth* (Basic Books, 1995)
- Freeman Dyson, *Origins of Life* (Cambridge University Press; 2nd edn, 1999)
- Pier Luigi Luisi, *The Emergence of Life: From Chemical Origins to Synthetic Biology* (Cambridge University Press; 2nd edn, 2016)
- Eric Smith and Harold Morowitz, *The Origin and Nature of Life on Earth* (Cambridge University Press, 2016)
- Woodruff T. Sullivan III and John A. Baross (eds.), *Planets and Life* (Cambridge University Press, 2007)
- Sara Walker and George Cody, 'Re-conceptualizing the origins of life', *Philosophical Transactions of The Royal Society* (theme issue), vol. 375, issue 2109 (2017)

7. THE GHOST IN THE MACHINE

- David Chalmers, *The Conscious Mind: In Search of a Fundamental Theory* (Oxford University Press; rev. edn, 1997)
- Daniel Dennett, *Consciousness Explained* (Little, Brown, 1991)
- George Ellis, *How Can Physics Underlie the Mind? Top-down Causation in the Human Context* (Springer, 2016)
- Douglas R. Hofstadter and Daniel C. Dennett, *The Mind's I: Fantasies and Reflections on Self and Soul* (Basic Books, 2001)
- Stuart Kauffman, *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity* (Oxford University Press, 1996)
- Arthur Koestler, *The Ghost in the Machine* (Hutchinson, 1967)
- Nancey Murphy, George F. R. Ellis and Timothy O'Connor (eds.), *Downward Causation and the Neurobiology of Free Will* (Springer, 2009)
- Roger Penrose, *The Emperor's New Mind: Concerning Computers, Minds and the Laws of Physics* (Oxford University Press, 1989)
- Bruce Rosenblum and Fred Kuttner, *Quantum Enigma: Physics Encounters Consciousness* (Oxford University Press; 2nd edn, 2011)