

Lähdeviitteet

JOHDANTO

- 1 J. Milton, *Paradise Lost*, S. Orgel ja J. Goldberg (Oxford, 2004), 4–6.
Käänt. Yrjö Jylhä: *Kadotettu paratiisi*, WSOY 1933.
- 2 YK:n pääsihteeri, "Secretary General's remarks to Climate Summit Preparatory Meeting", 30.6.2019.
- 3 Valkoinen talo, "Remarks by the President in State of Union Address", 20.1.2015.
- 4 Paavi Franciscuksen puhe, "The Energy Transition and Care of our Common Home", 14.6.2019.
- 5 "Statement by HE Xi Jinping, President of the People's Republic of China, at the General Debate of the 75th Session of the United Nations General Assembly", *China Daily*, 23.9.2020.
- 6 Greta Thunbergin puhe YK:n ilmastokokouksessa, NPR, 23.9.2019.
- 7 F. Braudel, *La Méditerranée: L'espace et l'histoire*, vol. 1 (Pariisi, 1949), 27.
- 8 A. Watson, *Agricultural Innovation in the Early Islamic World: The Diffusion of Crops and Farming Techniques, 700–1100* (Cambridge, 2008).
- 9 D. Zhang et al., "Climatic Change, Wars and Dynastic Cycles in China over the Last Millennium", *Climate Change* 76 (2006), 459–77; D. Zhang et al., "Climate Change and War Frequency in Eastern China over the Last Millennium", *Human Ecology* 35 (2007), 403–14.
- 10 Ka lidasa, *Meghadūtam: With the Kātāyani Sanskrit Commentary and English translation*, käänt. C. Maharaj (Varanasi, 1973); I. Rajamani, "Monsoon Feelings", teoksessa I. Rajamani, M. Pernau ja K. Butler Schofield (toim.), *Monsoon Feelings: A History of Emotions in the Rain* (New Delhi, 2018), 11–43.

- 11 Pakkotyöstä ks. esim Uzbek Forum for Human Rights, *Tashkent's Reforms Have Not Yet Reached Us: Unfinished Work in the Fight against Forced Labour in Uzbekistan's 2019 Cotton Harvest* (Berliini, 2019).
- 12 Central Asia Bureau for Analytical Reporting, "Насколько опасен воздух в Центральной Азии", 15.1.2020, <https://cabar.asia/ru/nasko-lko-opasen-vozduh-v-tsentralnoj-azii-obyasnyaem-na-grafikah>.
- 13 J. Itriarte, "Geometry by Design: Contribution of Lidar to the Understanding of Settlement Patterns of the Mound Villages in SW Amazonia", *Journal of Computer Applications in Archaeology* 3.1 (2020), 151–69.
- 14 O. Lokawalo Thabeng, E. Adam ja S. Merlo, "Spectral Discrimination of Archaeological Sites Previously Occupied by Farming Communities Using In Situ Hyperspectral Data", *Journal of Spectroscopy* (2019), 1–21.
- 15 N. Athfield et al., "Influence of marine sources on ^{14}C Ages: isotopic data from Watom Island, Papua New Guinea inhumations and pig teeth in light of new dietary standards", *Journal of the Royal Society of New Zealand* 38.1 (2008), 1–23.
- 16 O. Amichay et al., "A bazaar assemblage: reconstructing consumption, production and trade from mineralised seeds in Abbadi Jerusalem", *Antiquity* 93 (2019), 199–217.
- 17 J. Warner et al., "Investigating the influence of temperature and seawater $\delta^{18}\text{O}$ on *Donax obesulus* (Reeve, 1854) shell $\delta^{18}\text{O}$ ", *Chemical Geology* 588 (2022), 1–14.
- 18 Y. Aono ja K. Kazui, "Phenological Data Series of Cherry Tree Flowering in Japan and its Application to Reconstruction of Springtime Temperatures", *International Journal of Climatology* 28 (2008), 905–14.
- 19 A. Tarand ja O. Nordli, "The Tallinn Temperature Series Reconstructed Back Half a Millennium by Use of Proxy Data", *Climatic Change* 48 (2001), 189–99.
- 20 G. Hole et al., "A Driftwood-Based Record of Arctic Sea Ice during the Last 500 Years from Northern Svalbard Reveals Sea Ice Dynamics in the Arctic Ocean and Arctic Peripheral Seas", *Journal of Geophysical Research: Oceans* 126 (2021), 1–20.
- 21 C. Prud'homme et al., "Central Asian Modulation of Northern Hemisphere moisture transfer over the Late Cenozoic", *Communications Earth and Environment* 2 (2021), 1–8.
- 22 S. Liu et al., "Sedimentary ancient DNA reveals a threat of warming-induced alpine habitat loss to Tibetan plateau plant diversity", *Nature Communications* 12 (2021), 1–9.

- 23 M. McCormick et al., "Climate Change during and after the Roman Empire: Reconstructing the Past from Scientific and Historical Evidence", *Journal of Interdisciplinary History* 43.2 (2012), 169–220.
- 24 R. Anderson, N. Johnson ja M. Koyama, "Jewish Persecutions and Weather Shocks: 1100–1800", *Economic Journal* 127 (2015), 924–58.
- 25 M. Waldinger, "The Economic Effects of Long-Term Climate Change: Evidence from the Little Ice Age", Centre for Climate Change Economics and Policy, Working Paper 239 (2015); J. Martínez-González et al., "Assessing climate impacts on English economic growth (1645–1740): an econometric approach", *Climatic Change* 160 (2020), 233–49.
- 26 N. Stehr ja H. van Storch, "Von der Macht des Klimas: Ist der Klimadeterminismus nur noch Ideengeschichte oder relevanter Faktor gegenwärtiger Klimapolitik?", *Gaia* 9 (2000), 187–95.
- 27 D. Arnold ja R. Guha (toim.), *Nature, Culture, Imperialism: Essays on the Environmental History of South Asia* (Delhi, 1995), 1–20.
- 28 Hyytiä esimerkkejä ovat: J. Diamond, *Collapse: How Societies Choose to Fail or Succeed* (Lontoo, 2005); D. Webster, *The Fall of the Ancient Maya: Solving the Mystery of the Maya Collapse* (Lontoo, 2002); K. Harper, *The Fate of Rome: Climate, Disease and the End of an Empire* (Lontoo, 2017).
- 29 J. Tainter, "Collapse, sustainability, and the environment: how authors choose to fail or succeed", *Reviews in Anthropology* 37 (2008), 342–71.
- 30 D. Degroot et al., "Towards a rigorous understanding of societal responses to climate change", *Nature* 591 (2021), 539–50.
- 31 Herodotos, *The Histories*, toim. R. Waterfield ja C. Dewald (Oxford, 1998), 7.34–5, 420. Suomentanut Edvard Rein: *Historiaeos*, WSOY 1907. Tämän teoksen suomennoksessa lainatut otteet ovat Eemil Kankaanpään julkaisemattomia käänöksiä.
- 32 J. Woodruff et al., "Depositional evidence for the Kamikaze typhoon changes in typhoon climatology", *Geology* 43 (2015), 91–4; R. Sasaki, *The Origin of the Lost Fleet of the Mongol Empire* (College Station, TX, 2008).
- 33 Napoleonin hyökkäys, ks. A. Roberts, *Napoleon the Great* (Lontoo, 2014); D. Lieven, *Russia against Napoleon: The Battle for Europe, 1807–1814* (Lontoo, 2016); Hitleristä, A. Beevor, *Stalingrad* (Lontoo, 2007) ja D. Stahel, *Kiev, 1941: Hitler's Battle for Supremacy in the East* (Lontoo, 2012).
- 34 D. Chakrabarty, "The Climate of History: Four Theses", *Critical Inquiry* 35 (2009), 197–222.

- 35 Johdannoksi ks. R. Hide, D. Boggs ja J. Dickey, "Angular momentum fluctuations within the earth's liquid core and torsional oscillations of the core–mantle system", *Geophysical Journal International* 143 (2000), 777–86; R. Gross, I. Fukumori ja D. Menemenlis, "Atmospheric and oceanic excitation of decadal-scale Earth orientation variations", *Journal of Geophysical Research* 110 (2005), 1–15; J.-E. Lee et al., "Hemispheric sea ice distribution sets the glacial tempo", *Geophysical Research Letters* 44.2 (2017), 1008–14; E. Zorita, S. Wagner ja F. Schenk, "The Global Climate System", teoksessa S. White, C. Pfister ja F. Mauelshagen (toim.), *The Palgrave Handbook of Climate History* (Lontoo, 2018), 21–6.
- 36 M. McPhaden, S. Zebiak ja M. Glantz, "ENSO as an Integrating Concept in Earth Science", *Science* 314 (2006), 1740–5.
- 37 A. Turner ja H. Annamalai, "Climate change and the South Asian summer monsoon", *Nature Climate Change* 2 (2012), 587–95; P. Borah et al., "Indian monsoon derailed by a North Atlantic wavetrain", *Science* 370 (2020), 1335–8.
- 38 J. Luterbacher et al., "Circulation Dynamics and its Influence on European and Mediterranean January–April Climate over the Past Half Millennium: Results and Insights from Instrumental Data, Documentary Evidence and Coupled Climate Models", *Climatic Change* 101 (2010), 201–34.
- 39 J. Hansen et al., "Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modelling and modern observations that 2°C global warming could be dangerous", *Atmospheric Chemistry and Physics* 16 (2016), 3761–812.
- 40 S. McIntosh, "Deciphering solar magnetic activity: on the relationship between the sunspot cycle and the evolution of small magnetic features", *Astrophysical Journal* 792 (2014), 1–19.
- 41 I. Usoskin, "A history of solar activity over millennia", *Living Reviews in Solar Physics* 14.3 (2017), 1–97.
- 42 I. Usoskin et al., "The Maunder minimum (1645–1715) was indeed a grand minimum: a reassessment of multiple datasets", *Astronomy and Astrophysics* 581 (2015), 1–19.
- 43 J. Proctor et al., "Estimating global agricultural effects of geoengineering using volcanic eruptions", *Nature* 560 (2018), 480–3.
- 44 C. Oppenheimer, *Eruptions that Shook the World* (Cambridge, 2011), 64–6; G. Stenchikov et al., "Volcanic signals in oceans", *Journal of Geophysical Research* 114 (2009), 1–13.
- 45 S. Wilson et al., "Kilauea lava fuels phytoplankton bloom in the North Pacific Ocean", *Science* 365 (2019), 1040–4.

- 46 D. Arnold, "The Indian Ocean as a Disease Zone, 1500–1950", *South Asia: Journal of South Asian Studies* 14.2 (1991), 1–21.
- 47 E. Predybaylo et al., "El Niño/Southern Oscillation response to low-latitude volcanic eruptions depends on ocean pre-conditions and eruption timing", *Communications Earth & Environment* 1 (2020), 1–13.
- 48 M. Toohey et al., "Disproportionately strong climate forcing from extratropical explosive volcanic eruptions", *Nature Geoscience* 12 (2019), 100–7.
- 49 M. Burton, G. Sawyer ja D. Granieri, "Deep Carbon Emissions from Volcanoes", *Reviews in Mineralogy & Geochemistry* 75 (2013), 323–54.
- 50 L. Bollinger et al., "Seasonal modulation of seismicity in the Himalaya of Nepal", *Geophysical Research Letters* 34 (2007), 1–5; D. Panda et al., "Seasonal modulation of deep slow-slip and earthquakes on the Main Himalayan Thrust", *Nature Communications* 9 (2018), 1–8.
- 51 C. Liu, A. Linde ja S. Sacks, "Slow earthquakes triggered by typhoons", *Nature* 459 (2009), 833–6.
- 52 M. Harvey et al., "The evolution of a tropical biodiversity hotspot", *Science* 370 (2020), 1343–8.
- 53 McCormick et al., "Climate Change during and after the Roman Empire", erityisesti 174–91; E. Roy Ladurie, *Times of Feast, Times of Famine: A History of Climate since the Year 1000* (1971); H. Lamb, *Climate: Past, Present and Future* (Lontoo, 1972); G. Parker, *Global Crisis: War, Climate Change and Catastrophe in the Seventeenth Century* (Lontoo, 2013).
- 54 R. Neukom, "No evidence for globally coherent warm and cold periods over the preindustrial Common Era", *Nature* 571 (2019), 550–4.
- 55 E. Xoplaki et al., "Modelling Climate and Societal Resilience in the Eastern Mediterranean in the Last Millennium", *Human Ecology* 46 (2018), 363–79.
- 56 B. Stenni et al., "Antarctic climate variability on regional and continental scales over the last 2000 years", *Climate of the Past* 13 (2017), 1609–34.
- 57 IMF, *World Economic Outlook: Seeking Sustainable Growth – Short-term Recovery, Long-term Challenges* (Washington, DC, 2017), 117–83.
- 58 D. Thonalley, "Anomalously weak Labrador sea convection and Atlantic overturning during the past 150 years", *Nature* 556 (2018), 227–30; AMOCiin liittyen ks. M. Buckley ja J. Marshall, "Observations, inferences, and mechanisms of the Atlantic Meridional Overturning Circulation: A Review", *Reviews of Geophysics* 54 (2016), 5–63.

- 59 N. Boers, "Observation-based early-warning signals for a collapse of the Atlantic Meridional Overturning Circulation", *Nature Climate Change* 11 (2021), 680–8; L. Jackson et al., "Global and European climate impacts of a slowdown of the AMOC in a high resolution GCM", *Climate Dynamics* 45 (2015), 3299–316.
- 60 T. Lenton et al., "Climate", *Nature* 575 (2019), 592–5.
- 61 P. Crutzen, "Geology of mankind", *Nature* 415 (2002), 23.
- 62 Subcommission on Quaternary Stratigraphy, Working Group on the "Anthropocene", AWG:n sitovan äänestyksen tulos, 21.5.2019.
- 63 J. Brigham-Grette, "Pliocene Warmth, Polar Amplification, and Stepped Pleistocene Cooling Recorded in NE Arctic Russia", *Science* 340 (2013), 1421–7; J. Blundon ja S. Arndt (toim.), *State of the Climate in 2019*, Special Supplement, *Bulletin of the American Meteorological Society* 101 (2020); O. Dumitru, "Constraints on global mean sea level during Pliocene warmth", *Nature* 574 (2019), 233–6.
- 64 Yhdysvaltain liitoveltytähti sää- ja valtamerentutkimusorganisaatio NOAA, "Carbon dioxide peak for 2022 more than 50% higher than pre-industrial levels", 3.6.2022, <https://phys.org/news/2022-06-carbon-dioxide-peak-higher-pre-industrial.html>.
- 65 A. Braakman-Folgmann et al., "Observing the disintegration of the A68A iceberg from space", *Remote Sensing of Environment* 270 (2022), 1–9.
- 66 S. Kulp ja B. Strauss, "New elevation data triple estimates of global vulnerability to sea-level rise and coastal flooding", *Nature Communications* 10 (2019), 1–12.
- 67 Yhdistyneen kuningaskunnan valtiollinen tiedevirasto (Government Office for Science), *Future of the Sea: Current and Future Impacts of Sea Level Rise on the UK* (Lontoo, 2017).
- 68 J. Hinkel et al., "Coast Flood Damage and Adaptation Costs under 21st Century Sea-Level Rise", *Proceedings of the National Academy of Sciences of the USA* 111 (2014), 3292–7.
- 69 IMF, *World Economic Outlook: A Long and Difficult Ascent* (Washington, DC, 2020), 86.
- 70 UNICEF, *The Climate Crisis is a Child Rights Crisis* (New York, 2021).
- 71 D. Welsbey et al., "Unextractable fossil fuels in a 1.5 °C world", *Nature* 597 (2021), 230–4.
- 72 B. Lomborg, "Welfare in the 21st century: increasing development, reducing inequality, the impact of climate change and the cost of climate policies", *Technological Forecasting & Social Change* 156 (2020), 1–35.
- 73 Yhdysvaltain liikenneministeriö, National Highway Traffic Safety Administration, "The Safer Affordable Fuel-Efficient (SAFE) Vehicles

- Rule for Model Year 2021–2026 Passenger Cars ja Light Trucks”, Draft Environmental Impact Statement, 5–30.
- 74 Esim. ”Trump administration sees a 7-degree rise in global temperatures by 2100”, *Washington Post*, 28.9.2018.
- 75 Maailman terveysjärjestö (WHO), *Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease* (Geneva, 2106), 33.
- 76 C. Wiedinmyer, R. Yokelson ja B. Gullett, ”Global emissions of trace gases, particulate matter and hazardous air pollutants from open burning of domestic waste”, *Environmental Science & Technology* 18 (2014), 9523–30.
- 78 India State-Level Disease Burden Initiative Air Pollution Collaborators, ”Health and economic impact of air pollution in the states of India: The Global Burden of Disease Study 2019”, *Lancet Planetary Health* (2020), 1–14.
- 79 I. Flores, ”Afghanistan’s Air is Deadlier Than its War”, *Foreign Policy*, 26.5.2019.
- 80 S. Khomenko, ”Premature mortality due to air pollution in European cities: a health impact assessment”, *Lancet Planetary Health* (2021), 1–14.
- 81 K. Vohra et al., ”Global mortality from outdoor particulate pollution generated by fossil fuel combustion: results from GEOM-Chem”, *Environmental Research* 195 (2021), 1–8.
- 82 D. De Silva et al., ”Firm behaviour and pollution in small geographies”, *European Economic Review* 136 (2021), 1–33.
- 83 M. Shehab ja F. Pope, ”Effects of short-term exposure to particulate matter air pollution on cognitive performance”, *Scientific Reports* 9 (2019), 1–10.
- 84 A. Reuben et al., ”Association of Air Pollution Exposure in Childhood and Adolescence with Psychopathology at the Transition to Adulthood”, *JAMA Network Open* 4 (2021), 1–14; P. Mok et al., ”Exposure to ambient air pollution during childhood and subsequent risk of self-harm: a national cohort study”, *Preventive Medicine* 152 (2021), 1–7.
- 85 M. Prunicki et al., ”Air pollution exposure is linked with methylation of immunoregulatory genes, altered immune cell profile and increased blood pressure in children”, *Scientific Reports* 11 (2021), 1–12.
- 86 Maailmanpankki, *The Global Health Cost of PM_{2.5} Air Pollution: A Case for Action Beyond 2021* (Washington, D.C, 2022).
- 87 IPBES, *The Global Assessment Report on Biodiversity and Ecosystem Services* (Pariisi, 2019).
- 88 N. Welden, ”The environmental impacts of plastic pollution”, teoksessa T. Letcher (toim.), *Plastic Waste and Recycling: Environmental Impact, Societal Issues, Prevention, and Solutions* (Lontoo, 2020), 195–222.

- 89 National Federation of Women's Institutes, *In a Spin: How our Laundry is Contributing to Plastic Pollution* (2018).
- 90 P. Ross et al., "Pervasive distribution of polyester fibres in the Arctic Ocean is driven by Atlantic inputs", *Nature Communications* 12 (2021), 1–9.
- 91 K. Cox et al., "Human Consumption of Microplastics", *Environment, Science and Technology* 53 (2019), 7068–74; A. Ragusa et al., "Plasticenta: First evidence of microplastics in human placenta", *Environment International* 146 (2021), 1–8; J. Zhang et al., "Occurrence of Polyethylene Terephthalate and Polycarbonate Microplastics in Infant and Adult Feces", *Environment, Science and Technology* (2021), 7068–74; H. Leslie et al., "Discovery and quantification of plastic particle pollution in human blood", *Environment International* 163 (2022), 1–8.
- 92 E. Nic Lughadha, "Extinction risk and threats to plants and fungi", *Plants People Planet* 2 (2020), 389–408.
- 93 F. Sánchez-Bayo ja K. Wyckhuys, "Worldwide decline of the entomofauna: a review of its drivers", *Biological Conservation* 232 (2019), 8–27.
- 94 IPBES, *Global Assessment Report*, II.
- 95 S. Ryding et al., "Shape-shifting: changing animal morphologies as a response to climatic warming", *Trends in Ecology & Evolution* (2021), 1–13.
- 96 B. Ahmed et al., "Maternal heat stress reduces body and organ growth in calves: relationship to immune status", *JDS Communications* 2 (2021), 295–9.
- 97 E. Stokstad, "New global study reveals the 'staggering' loss of forests caused by industrial agriculture", *Science* (2018); G. Pecl et al., "Biodiversity redistribution under climate change: impacts on ecosystems and human well-being", *Science* 355 (2017).
- 98 K. Chandra et al., *Assemblages of Lepidoptera in Indian Himalaya through Long Term Monitoring Plots* (Kolkata, 2019).
- 99 S. Chalkin, S. Dubiner ja J. Belmaker, "Cold-water species deepen to escape warm water temperatures", *Global Ecology & Biogeography* (2021).
- 100 R. Almond, M. Grooten ja T. Peterson (toim.), *Living Planet Report 2020: Bending the Curve of Biodiversity Loss*, World Wildlife Fund (Gland, 2020).
- 101 K. Rosenberg, "Decline of the North American avifauna", *Science* 366 (2019), 120–4; IPBES, *Global Assessment Report*, 24.

- 102 E. Schulz et al., "Climate-driven, but dynamic and complex? A reconciliation of competing hypotheses for species' distributions", *Ecology Letters* 25 (2022), 1–14.
- 103 V. Danneyrolles et al., "Scale-dependent changes in tree diversity over more than a century in eastern Canada: Landscape diversification and regional homogenization", *Journal of Ecology* 109 (2021), 273–83.
- 104 M. Dornelas et al., "A balance of winners and losers in the Anthropocene", *Ecology Letters* 22 (2019), 847–54.
- 105 B. Leung et al., "Clustered versus catastrophic global vertebrate declines", *Nature* 588 (2020), 267–71.
- 106 G. Ceballos, P. Ehrlich ja R. Dirzo, "Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines", *Proceedings of the National Academy of Sciences of the USA* 114 (2017), 6089–96.
- 107 K. Martin et al., "The biogeographic differentiation of algal microbiomes in the upper ocean from pole to pole", *Nature Communications* 12 (2021), 1–14.
- 108 Ks. esim. J. Memmott, N. Waser ja M. Price, "Tolerance of pollination networks to species extinctions", *Philosophical Transactions of the Royal Society of London B* 271 (2004), 2605–11; J. Herrera, J. Moody ja C. Nunn, "Predictions of primate-parasite coextinction", *Philosophical Transactions of the Royal Society of London B* 376 (2021), 1–8.
- 109 R. Cowie, P. Bouchet ja B. Fontaine, "The Sixth Mass Extinction: fact, fiction or speculation?", *Biological Reviews* (2022), 1–24.
- 110 C. Bradshaw et al., "Underestimating the Challenges of Avoiding a Ghastly Future", *Frontiers in Conservation Science* 1 (2021), 1–10.
- 111 L. Borck, "Constructing the Future History: Prefiguration as Historical Epistemology and the Chronopolitics of Archaeology", *Journal of Contemporary Archaeology* 5.2 (2018), 229–38.
- 112 L. Zhao, "Global multi-model projections of local urban climates", *Nature Climate Change* (2021), 1–19.
- 113 N. Grimm, "Global change and the ecology of cities", *Science* 319 (2008), 756–60.
- 114 Liqun Sun et al., "Dramatic uneven urbanisation of large cities throughout the world in recent decades", *Nature Communications* 11 (2020), 1–9.
- 115 H. Ritchie ja M. Roser, "Urbanization", Our World in Data, <https://ourworldindata.org/urbanization#how-many-people-will-live-in-urban-areas-in-the-future>.

- 116 R. Geyer, J. Jambeck ja K. Law, "Production, use, and fate of all plastics ever made", *Science Advances* 3 (2017), 1–5.
- 117 E. Elhacham et al., "Global human-made mass exceeds all living biomass", *Nature* 588 (2020), 442–4.
- 118 Aristoteles, *Politics*, kään. H. Rackham (Cambridge, MA, 1932), I.2, 10–12. Suomentanut A. M. Anttila: *Politiikka*, Gaudeamus 1991.
- 119 Ibn Fadlān, *Book of Ahmad ibn Fadlān*, teoksessa *Ibn Fadlan and the Land of Darkness: Arab Travellers in the Far North*, kään. P. Lunde ja C. Stone (Lontoo, 2011), 12.
- 120 R. Keller ja M. Turek, *American Indians and National Parks* (Tucson, AZ, 1998), 132–84.
- 121 S. Garnett et al., "A spatial overview of the global importance of Indigenous lands for conservation", *Nature Sustainability* 1 (2018), 369–74; W. Walker, "The role of forest conversion, degradation, and disturbance in the carbon dynamics of amazon Indigenous territories and protected areas", *Proceedings of the National Academy of Sciences of the USA* 117 (2020), 3015–25.
- 122 V. Carter, "Legacies of Indigenous Land Use Shaped Past Wildfire Regimes in the Basin-Plateau Region, USA", *Communications Earth & Environment* 2 (2021), 1–9.
- 123 C. Armstrong et al., "Historical Indigenous Land-Use Explains Plant Functional Trait Diversity", *Ecology and Society* 26 (2021), 1–9.

MAAILMA AAMUN SARASTUKSESTA ALKAEN

- 1 N. Sleep et al., "Initiation of Clement Surface Conditions on the Earliest Earth", *Proceedings of the National Academy of Sciences of the USA* 98 (2001), 3666–72.
- 2 C. Stringer, "The origin and evolution of *Homo sapiens*", *Philosophical Transactions of the Royal Society B*, 371 (2016), 1–12.
- 3 E. Crist, "On the Poverty of Our Nomenclature", *Environmental Humanities* 3 (2013), 129–47; D. Kidner, "Why 'anthropocentrism' is not anthropocentric", *Dialectical Anthropology* 38 (2014), 465–80.
- 4 P. Sossi, "Redox state of Earth's magma ocean and its Venus-like early atmosphere", *Science Advances* 6 (2020), 1–8; A. Morbidelli, "Building Terrestrial Planets", *Annual Review of Earth and Planetary Sciences* 40 (2012), 251–75.
- 5 B. Hess, S. Piazolo ja J. Harvey, "Lightning strikes as a major facilitator of prebiotic phosphorus reduction on early Earth", *Nature Communications* 12 (2021), 1–8.

- 6 R. Riding, P. Fralick ja L. Liang, "Identification of an Archean marine oxygen oasis", *Precambrian Research* 251 (2014), 232–7. Ks. myös Y. Bromberg, "Quantifying structural relationships of metal-binding sites suggests origins of biological electron transfer", *Science Advances* 8 (2022), 1–13.
- 7 B. Schirrmeister, M. Gugger ja P. Donoghue, "Cyanobacteria and the Great Oxidation Event: evidence from genes and fossils", *Paleontology* 58 (2015), 769–85; J. Klatt et al., "Possible link between Earth's rotation rate and oxygenation", *Nature Geoscience* 14 (2021), 564–70; J. Meixnerová et al., "Mercury abundance and isotopic composition indicate subaerial volcanism prior to the end-Achean 'whiff' of oxygen", *PNAS* 118 (2021), 1–6.
- 8 A. Walsh, T. Ball ja D. Schultz, "Extreme sensitivity in Snowball Earth formation to mountains on PaleoProterozoic supercontinents", *Scientific Reports* 9 (2019), 1–7.
- 9 R. Mitchell et al., "Orbital forcing of ice sheets during Snowball Earth", *Nature Communications* 12 (2021), 1–9.
- 10 T. Johnson et al., "Giant impacts and the origin and evolution of continents", *Nature* 608 (2022), 330–5.
- 11 R. Kopp et al., "The Paleoproterozoic Snowball Earth: A climate disaster triggered by the evolution of oxygenic photosynthesis", *Proceedings of the National Academy of Sciences of the USA* 102 (2005), 11,131–6.
- 12 S. Poulton et al., "A 200-million-year delay in permanent atmospheric oxygenation", *Nature* 592 (2021), 232–6.
- 13 P. Hoffman et al., "Snowball Earth climate dynamic sand Cryogenian geology-geobiology", *Science Advances*, 3 (2017), 1–43.
- 14 C. Simpson, "Adaptation to a viscous Snowball Earth Ocean as a path to complex multicellularity", *American Naturalist* (2021), 590–609.
- 15 Z. Zhu, "The temporal distribution of Earth's supermountains and their potential link to the rise of atmospheric oxygen and biological evolution", *Earth and Planetary Science Letters* 580 (2022), 1–10.
- 16 S. Evans, M. Droser ja D. Erwin, "Developmental processes in Ediacara macrofossils", *Proceedings of the Royal Society B* 288 (2021), 1–10.
- 17 J.-B. Hou, N. Hughes ja M. Hopkins, "The trilobite upper limb branch is a well-developed gill", *Science Advances* 7 (2021), 1–8.
- 18 P. Sheehan, "The Late Ordovician Mass Extinction", *Annual Review of Earth and Planetary Sciences* 29 (2001), 331–64.
- 19 D. Bond ja S. Grasby, "Late Ordovician Mass Extinction caused by volcanism, warming, and anoxia, not cooling and glaciation", *Geology* 48 (2020), 777–81; ks. myös A. Pohl, "Vertical decoupling in Late

- Ordovician anoxia due to reorganization of ocean circulation”, *Nature Geoscience* (2021), 1–13.
- 20 H. Yndestad, ”The influence of the lunar nodal cycle on Arctic climate”, *Journal of Marine Science* 63 (2006), 401–20. Kuun muotoutumisesta S. Desch ja K. Robinson, ”A unified model for hydrogen in the Earth and Moon: No one expects the Theia contribution”, *Geochemistry* 79 (2019), 1–16.
- 21 H. Byrne et al., ”Tides: a key environmental driver of osteichthyan evolution and the fish-tetrapod transition?”, *Proceedings of the Royal Society A* 476 (2020), 1–19.
- 22 N. Kronfeld-Schor, ”Chronobiology by moonlight”, *Proceedings of the Royal Society B* 280 (2013), 1–11.
- 23 P. Kaniewska et al., ”Signaling cascades and the importance of moonlight in coral broadcast mass spawning”, *ELife* 4 (2015), 1–14.
- 24 A. Sinclair, ”Lunar cycle and timing of mating season in Serengeti wildebeest”, *Nature* 267 (1977), 832–3; T. Yonezawa et al., ”Lunar cycle influences spontaneous delivery in cows”, *PLOS ONE* 11 (2016), 1–8.
- 25 L. Nash, ”Moonlight and behaviour in nocturnal and cathemeral primates, especially *Lepilemur leucopus*: illuminating possible anti-predator efforts”, teoksessa S. Gursky ja K. Nekaris (toim.), *Developments in Primatology: Progress and Prospects* (Berliini, 2007), 173–87.
- 26 B. Phalan, ”Foraging behaviour of four albatross species by night and day”, *Marine Ecology Progress Series* 340 (2007), 271–86.
- 27 G. Norevik, ”The lunar cycle drives migration of a nocturnal bird”, *PLOS Biology* 17 (2019), 1–13.
- 28 L. Casiraghi et al., ”Moonstruck sleep: synchronization of human sleep with the moon cycle under field conditions”, *Science Advances* 7 (2021), 1–8.
- 29 C. Helfrich-Förster et al., ”Women temporarily synchronize their menstrual cycles with the luminance and gravimetric cycles of the Moon”, *Science Advances* 7 (2021), 1–13.
- 30 R. Foster ja T. Rosenberg, ”Human responses to the geophysical daily, annual and lunar cycles”, *Current Biology* 18 (2008), 784–94.
- 31 T. Wehr, ”Bipolar mood cycles and lunar tidal cycles”, *Molecular Psychiatry* 23 (2018), 923–31.
- 32 X. Zhang, ”Lunar tide in the thermosphere and weakening of the northern polar vortex”, *Geophysical Research Letters* 41 (2014), 8201–7.

- 33 S. Burgess, "High-precision geochronology confirms voluminous magmatism before, during and after Earth's most severe extinction", *Science Advances* 1 (2015), 1–14.
- 34 S. Burgess, "Initial pulse of Siberian Traps Sills as the trigger of the end-Permian mass extinction", *Nature Communications* 8 (2017), 1–6.
- 35 M. Benton, "Hyperthermal-driven mass extinctions: killing models during the Permian-Triassic mass extinction", *Philosophical Transactions of the Royal Society A* 376 (2018), 1–19; J. Fan et al., "A high-resolution summary of Cambrian to Early Triassic marine invertebrate biodiversity", *Science* 367 (2020), 272–7; P. Viglietti et al., "Evidence from South Africa for a protracted end-Permian extinction on land", *PNAS* 118 (2021), 1–8; C. Mays ja S. McLoughlin, "End-Permian Burnout: The role of Permian-Triassic wildfires in extinction, carbon cycling and environmental change in Eastern Gondwana", *Palaeos* 37 (2022), 292–317.
- 36 J. Davies et al., "End-Triassic mass extinction started by intrusive CAMP activity", *Nature Communications* 8 (2017), 1–8.
- 37 C. Fox et al., "Molecular and isotopic evidence reveals the end-Triassic carbon isotope excursion is not from massive exogenous light carbon", *PNAS* 117 (2020), 30,171–8; ks. myös K. Kaiho et al., "Volcanic temperature changes modulated volatile release and climate fluctuations at the end-Triassic mass extinction", *Earth and Planetary Science Letters* 579 (2022), 1–12; C. Fox et al., "Flame out! End-Triassic mass extinction polycyclic aromatic hydrocarbons reflect more than just fire", *Earth and Planetary Science Letters* 584 (2022), 1–13.
- 38 Ks. esim. P. Olsen, "Arctic ice and the ecological rise of the dinosaurs", *Science Advances* 26 (2022), 1–9.
- 39 S. Singh et al., "Niche partitioning shaped herbivore macroevolution through the early Mesozoic", *Nature Communications* 12 (2021), 1–13.
- 40 L. Alvarez et al., "Extraterrestrial Cause for the Cretaceous-Tertiary Extinction", *Science* 208 (1980), 1095–1108.
- 41 A. Garde et al., "Searching for giant, ancient impact structures on Earth: The Mesoarchean Maniitsoq structure, West Greenland", *Earth and Planetary Science Letters* 337–8 (2012), 192–210.
- 42 N. Artemieva ja J. Morgan, "Quantifying the Release of Climate-Active Gases by Large Meteorite Impacts with a Case Study of Chicxulub", *Geophysical Research Letters* 44 (2017), 180–8; M. Range et al., "The Chicxulub Impact Produced a Powerful Global Tsunami", *AGU Advances* 3 (2022), 1–21.

- 43 A. Siraj ja A. Loeb, 'Breakup of a long-period comet as the origin of the dinosaur extinction', *Scientific Advances* 11 (2021), 1–5.
- 44 D. Degroot, "A Catastrophe Happening in Front of our Very Eyes: The Environmental History of a Comet Crash on Jupiter", *Environmental History* 22 (2017), 32–3.
- 45 A. Siraj ja A. Loeb, "Breakup of long-period comet as the origin of the dinosaur extinction", *Scientific Reports* 11 (2021), 1–5.
- 46 M. During et al., "The Mesozoic terminated in boreal spring", *Nature* 603 (2022), 91–4.
- 47 R. DePalma et al., "Seasonal calibration of the end-cretaceous Chicxulub impact event", *Scientific Reports* 11 (2021), 1–8.
- 48 B. Schoene, "U-Pb constraints on pulsed eruption of the Deccan Traps across the end-Cretaceous mass extinction", *Science* 363 (2019), 862–6; C. Sprain et al., "The eruptive tempo of Deccan volcanism in relation to the Cretaceous–Paleogene boundary", *Science* 363 (2019), 866–70.
- 49 K. Kaiho ja N. Oshima, "Site of asteroid impact changed the history of life on Earth: the low probability of mass extinction", *Scientific Reports* 7 (2017), 1–12.
- 50 M. Carvalho et al., "Extinction at the end-Cretaceous and the origin of modern Neotropical rainforests", *Science* 372 (2021), 63–8.
- 51 M. Gutjahr et al., "Very large release of mostly volcanic carbon during the Paleocene–Eocene Thermal Maximum", *Nature* 548 (2017), 573–7.
- 52 M. Huber, "A hotter greenhouse?", *Science* 321 (2008), 353–4.
- 53 A. Winguth et al., "Climate Response at the Paleocene–Eocene Thermal Maximum to Greenhouse Gas Forcing – A Model Study with CCSM₃", *Journal of Climate* 23 (2010), 2564–84.
- 54 F. McInerney ja S. Wing, "The Paleocene–Eocene Thermal Maximum: A Perturbation of Carbon Cycle, Climate, and Biosphere with Implications for the Future", *Annual Review of Earth and Planetary Sciences* 39 (2011), 489–516; S. Kender, "Paleocene/Eocene carbon feedbacks triggered by volcanic activity", *Nature Communications* 12 (2021), 1–10.
- 55 Ibid.; ks. myös C. Jaramillo et al., "Effects of rapid global warming at the Paleocene–Eocene boundary on Neotropical vegetation", *Science* 330 (2010), 957–61.
- 56 V. Lauretano et al., "Eocene to Oligocene terrestrial Southern Hemisphere cooling caused by declining pCO₂", *Nature Geoscience* (2021), 1–16.
- 57 B. Mason, D. Pyle ja C. Oppenheimer, "The size and frequency of the largest explosive eruptions on Earth", *Bulletin of Vulcanology* 66 (2004),

- 735–48; O. Bachmann, M. Dungan ja P. Lipman, "The Fish Canyon Magma Body, San Juan Volcanic Field, Colorado: Rejuvenation and Eruption of an Upper-Crustal Batholith", *Journal of Petrology* 43 (2002), 1469–1503.
- 58 K. Sieh et al., "Australasian impact crater buried under the Bolaven volcanic field, Southern Laos", *Proceedings of the National Academy of Sciences of the USA* 117 (2020), 1346–53.
- 59 E. de la Vega et al., "Atmospheric CO₂ during the Mid-Piacenzian Warm Period and the M2 glaciation", *Scientific Reports* 10 (2020), 1–8; R. Zhang, D. Jiang ja Z. Zhang, "Causes of mid-Pliocene strengthened summer and weakened winter monsoons over East Asia", *Advances in Atmospheric Sciences* 12 (2015), 1016–26.
- 60 N. Zhang et al., "The dominant driving force for supercontinent breakup: Plume push or subduction retreat?", *Geoscience Frontiers* 9 (2018), 997–1007; L. Chen et al., "Subduction tectonics vs. Plume tectonics – Discussion on driving forces for plate motion", *Science China Earth Sciences* 63 (2020), 315–28.
- 61 D. van Hinsbergen, "A record of plume-induced plate rotation triggering subduction initiation", *Nature Geoscience* 14 (2021), 626–30.
- 62 N. Mortimer et al., "Zealandia: Earth's Hidden Continent", *GSA Today* 27 (2017), 27–35.
- 63 D. van Hinsbergen et al., "Orogenic architecture of the Mediterranean region and kinematic reconstruction of its tectonic evolution since the Triassic", *Gondwana Research* 81 (2020), 79–229.
- 64 J. Flynn et al., "A new fossil mammal assemblage from the southern Chilean Andes: implications for geology, geochronology, and tectonics", *Journal of South American Earth Sciences* 15 (2002), 285–302; R. Enay ja E. Cariou, "Ammonite faunas and palaeobiogeography of the Himalayan belt during the Jurassic: Initiation of a Late Jurassic austral ammonite fauna", *Palaeogeography, Palaeoclimatology, Palaeoecology* 134 (1997), 1–38.
- 65 M. Pontoppidan et al., "Large-scale regional model biases in the extratropical North Atlantic storm track and impacts on downstream precipitation", *Quarterly Journal of the Royal Meteorological Society* 145 (2019), 2718–32.
- 66 G. Jung, M. Prange ja M. Schulz, "Influence of topography on tropical African vegetation coverage", *Climate Dynamics* 46 (2016), 2535–49.
- 67 W. Sun, "Northern Hemisphere Land Monsoon Precipitation Increased by the Green Sahara During Middle Holocene", *Geophysical Research Letters* 46 (2019), 9870–9.

- 68 A. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, CT, 1972); J. Diamond, *Guns, Germs and Steel: A Short History of Everybody for the Last 13,000 Years* (Lontoo, 1997).
- 69 Z. Zhang et al., "Aridification of the Sahara desert caused by the Tethys Sea shrinkage during the Late Miocene", *Nature* 513 (2014), 401–4; A. Holbourn et al., "Changes in Pacific Ocean circulation following the Miocene onset of permanent Antarctic ice cover", *Earth and Planetary Science Letters* 365 (2013), 38–50.
- 70 Z. Zhang et al., "Aridification of the Sahara desert caused by the Tethys Sea shrinkage during the Late Miocene", *Nature* 513 (2014), 401–4; A. Holbourn et al., "Changes in Pacific Ocean circulation following the Miocene onset of permanent Antarctic ice cover", *Earth and Planetary Science Letters* 365 (2013), 38–50.
- 71 P. Mann, L. Gahagan ja M. Gordon, "Tectonic setting of the world's giant oil and gas fields", in M. Halbouty (toim.), *Giant Oil and Gas Fields of the Decade, 1990–1999* (Tulsa, OH, 2003), 15–105.
- 72 G. Feulner, "Formation of most of our coal brought Earth close to global glaciation", *Proceedings of the National Academy of Sciences of the USA* 114 (2017), 11,333–7.
- 73 K. Pomeranz, *The Great Divergence: China, Europe and the Making of the Modern World Economy* (Princeton, 2000).
- 74 D. Zizzamia, "Restoring the Paleo-West: Fossils, Coal, and Climate in Late Nineteenth Century America", *Environmental History* 24 (2019), erityisesti 133–9.
- 75 B. Rogers, "The Processes and People in the Rise of Instant Cities and their Evolution into the Twenty-First Century", in G. Bakken (toim.), *The World of the American West* (Lontoo, 2010), 267–307.
- 76 F. Egli, N. Schmid ja T. Schmidt, "Electoral response to the decline of coal mining in the United States", *SSRN* (2020), 1–54.
- 77 S. Dutch, "Geology and Election 2000: Overview", <https://stevedutch.net/research/elec2000/geolelec2000.htm>.
- 78 Hyvä yleiskatsaus on D. Yergin, *The Prize: The Epic Quest for Oil, Money & Power* (New York, 2008).
- 79 E. Rogan, *The Fall of the Ottomans: The Great War in the Middle East, 1914–1920* (Lontoo, 2015); D. Fieldhouse, *Western Imperialism in the Middle East, 1914–1958* (Lontoo, 2006).
- 80 P. Frankopan, *The Silk Roads: A New History of the World* (Lontoo, 2015), 357–76, suomentanut Jaana Iso-Markku: *Silkkitiet: Uusi maailmanhistoria*, Atena 2021. D. Yergin, *The Prize: The Epic Quest*

- for Oil, Money and Power* (New York, 1991), 333–49; J. Tolland, *The Rising Sun: The Decline and Fall of the Japanese Empire, 1936–1945* (Lontoo, 1970).
- 81 M. Willbold, T. Elliott ja S. Moorbat, "The tungsten isotopic composition of the Earth's mantle before the terminal bombardment", *Nature* 477 (2011), 195–8.
 - 82 D. Siegel, J. Barnes ja B. Metzger, "Collapsars as a major source of r-process elements", *Nature* 569 (2019), 241–4.
 - 83 C. McLeod ja B. Shaulis, "Rare Earth Elements in Planetary Crusts: Insights from the Chemically Evolved Igneous Suites on Earth and the Moon", *Minerals* 8 (2018), 1–24.
 - 84 C. McLeod ja M. Krekeler, "Source of Extraterrestrial Rare Earth Elements: To the Moon and Beyond", *Resources* 6 (2017), 1–28.
 - 85 Ks. esim. S. Sagan, *The Limits of Safety: Organisations, Accidents, and Nuclear Weapons* (Princeton, 2020).
 - 86 S. Baum, R. de Neufville ja A. Barrett, "A Model for the Probability of Nuclear War", Global Catastrophic Risk Institute Working Paper 18-1 (2018), 1–39.
 - 87 "Hawaii missile alert: False alarm sparks panic in US State", BBC News, 14.1.2018.

LAJIMME ALKUPERÄSTÄ

- 1 K. Langergraber, "Generation times in wild chimpanzees and gorillas suggest earlier divergence times in great ape and human evolution", *Proceedings of the National Academy of Sciences of the USA* 109 (2012), 15,716–21; O. Venn et al., "Strong male bias drives germline mutation in chimpanzees", *Science* 344 (2014), 1272–5.
- 2 A. Beaufet et al., "Preliminary paleohistological observations of the StW 573 ("Little Foot") skull", *eLife* (2021), 1–8. Myös D. Granger et al., "Cosmogenic nuclide dating of *Australopithecus* at Sterkfontein, South Africa", *PNAS* 119 (2022), 1–7.
- 3 K. Carlson et al., "The pectoral girdle of StW 573 ("Little Foot") and its implications for shoulder evolution in the Hominina", *Journal of Human Evolution* (2021), 1–28.
- 4 B. Villmoare et al., "Early *Homo* at 2.8 Ma from Ledi-Geraru, Afar, Ethiopia", *Science* 347 (2015), 1352–5; ks. kuitenkin myös H. Püschel et al., "Divergence-time estimates for hominins provide insight into encephalization and body mass trends in human evolution", *Nature Ecology & Evolution* (2021), 1–24.

- 5 W. Kimbel ja B. Villmoare, "From *Australopithecus* to *Homo*: the transition that wasn't", *Proceedings of the Royal Society B* 371 (2016), 1–10.
- 6 B. Wood ja J. Baker, "Evolution in the genus *Homo*", *Annual Review of Ecology, Evolution and Systematics* 42 (2011), 47–69.
- 7 F. Spoor et al., "Reconstructed *Homo habilis* type OH 7 suggests deep-rooted species diversity in early *Homo*", *Nature* 519 (2015), 83–6.
- 8 Ks. esim. H. Dunsworth, "Origin of the Genus *Homo*", *Evolution: Education and Outreach* 3 (2010), 353–66.
- 9 E. Vrba, "Role of Environmental Stimuli in Hominid Origins", in W. Henke ja I. Tattersall, *Handbook of Paleoanthropology* (New York, 2007), 1837–86.
- 10 S. Antón, R. Potts ja L. Aiello, "Evolution of early *Homo*: An integrated biological perspective", *Science* 345 (2014), 1–15.
- 11 A. Harries et al., "Contemporaneity of *Australopithecus*, *Paranthropus* and early *Homo erectus* in South Africa", *Science* 368 (2020), 1–21.
- 12 R. Potts et al., "Environmental and behavioural evidence pertaining to the evolution of early *Homo*", *Current Anthropology* 53 (2012), 299–312.
- 13 J. Ferrero et al., "Earliest archaeological evidence of persistent hominin carnivory", *PLOS ONE* 8 (2013), 1–10; D. Braun et al., "Early hominin diet included diverse terrestrial and aquatic animals 1.95 Ma in East Turkana, Kenya", *Proceedings of the National Academy of Sciences of the USA* 107 (2010), 10,002–7.
- 14 C. Broadhurst, S. Cunnane ja M. Crawford, "Rift Valley lake fish and shellfish provided brain-specific nutrition for early *Homo*", *British Journal of Nutrition* 79 (1998), 3–21.
- 15 M. Raghanti et al., "A neurochemical hypothesis for the origin of hominids", *Proceedings of the National Academy of Sciences of the USA* 115 (2018), 1108–16.
- 16 J. Gowlett, C. Gamble ja R. Dunbar, "Human evolution and the archaeology of the social brain", *Current Anthropology* 53 (2012), 693–722; A. Pinson et al., "Human TKL1 implies greater neurogenesis in frontal neocortex of modern humans than Neanderthals", *Science* 377 (2022), 1–12. Yleiskatsauksena ks. A. Barona, "The archaeology of the social brain revisited: rethinking mind and material culture from a material engagement perspective", *Adaptive Behaviour* (2020), 1–16.
- 17 H. Christian, "Global frequency and distribution of lightning as observed from space by the Optical Transient Detector", *Journal of Geophysical Research* 108 (2003), 4–15.
- 18 J. Gowlett, "The discovery of fire by humans: a long and convoluted process", *Philosophical Transactions of the Royal Society B* 371 (2016), 1–12.

- 19 H. de Lumley, "Il y a 400 000 ans: la domestication du feu, un formidable moteur d'hominisation", *Comptes Rendus Palevol* 5 (2006), 149–54.
- 20 M. Maslin ja B. Christiansen, "Tectonics, orbital forcing, global climate change and human evolution in Africa: introduction to the African paleoclimate", *Journal of Human Evolution* 53 (2007), 443–64; S. Kaboth-Bahr et al., "Paleo-ENSO influence on African environments and early modern humans", *PNAS* 118 (2021), 1–6.
- 21 A. Bergström et al., "Origins of modern human ancestry", *Nature* 590 (2021), 229.
- 22 A. Barash et al., "The earliest Pleistocene record of a large-bodied hominin from the Levant supports two out-of-Africa dispersal events", *Scientific Reports* 12 (2022), 1–9.
- 23 R. Ferring et al., "Earliest human occupations at Dmanisi (Georgian Caucasus) dated to 1.85–1.78 Ma", *Proceedings of the National Academy of Sciences of the USA* 108 (2011), 10,432–6.
- 24 R. Zhu et al., "Early evidence of the genus *Homo* in East Asia", *Journal of Human Evolution* 55 (2008), 1075–85; R. Larick, "Early Pleistocene $^{40}\text{Ar}/^{39}\text{Ar}$ ages for Bapang Formation hominins, Central Jawa, Indonesia", *PNAS* 98 (2001), 4866–71; M. Arzarello, "Evidence of earliest human occurrence in Europe: The site of Pirro Nord (Southern Italy)", *Naturwissenschaften* 94 (2007), 107–12.
- 25 Stringer, "Origin and evolution of *Homo sapiens*", 1–12; A. Gómez-Robles, "Dental evolutionary rates and its implications for the Neanderthal–modern human divergence", *Science Advances* 5 (2019), 1–9; X. Ni et al., "Massive cranium from Harbin in northeastern China establishes a new Middle Pleistocene human lineage", *The Innovation* (2021), 1–7.
- 26 D. Reich et al., "Genetic history of an archaic hominin group from Denisova Cave in Siberia", *Nature* 468 (2010), 1053–60; J. Krause et al., "The complete mitochondrial DNA genome of an unknown hominin from southern Siberia", *Nature* 464 (2010) 894–7; I. Hershkovitz et al., "A Middle Pleistocene *Homo* from Nesher Ramla, Israel", *Science* 372 (2021), 1424–8; J. Teixeira et al., "Widespread Denisovian ancestry in Island Southeast Asia but no evidence of substantial super-archaic hominin admixture", *Nature Ecology & Evolution* (2021), 1–11.
- 27 P. Qin ja M. Stoneking, "Denisovan Ancestry in East Eurasian and Native American Populations", *Molecular Biology & Evolution* 32 (2015), 2665–74; B. Bonifante, "A GWAS in Latin Americans identifies novel face shape loci, implicating VPS13B and a Denisovan introgressed

- region in facial variation”, *Science Advances* 7 (2021), 1–18; P. Zhang et al., ”Denisovans and *Homo sapiens* on the Tibetan Plateau: dispersals and adaptations”, *Trends in Ecology & Evolution* (2021); D. Zhang, ”Denisovan DNA in Late Pleistocene sediments from Baishiya Karst Cave on the Tibetan Plateau”, *Science* 370 (2020), 584–7.
- 28 M. Hajdinjak et al., ”Initial Upper Paleolithic humans in Europe had recent Neanderthal ancestry”, *Nature* 592 (2021), 253–7.
 - 29 H. Zeberg ja S. Pääbo, ”A genomic region associated with protection against severe COVID-19 is inherited from Neanderthals”, *PNAS* 118 (2021), 1–5.
 - 30 A. Steegmann, F. Cerny ja T. Holliday, ”Neanderthal cold adaptation: Physiological and energetic factors”, *American Journal of Human Biology* 14 (2002), 566–83.
 - 31 J.-J. Hublin ja W. Roebroeks, ”Ebb and flow or regional extinctions? On the character of Neanderthal occupation of northern environments”, *Comptes Rendus Palevol* 8 (2009), 503–9.
 - 32 B. Vernot et al., ”Unearthing Neanderthal population history using nuclear and mitochondrial DNA from cave sediments”, *Science* 372 (2021), 1–8.
 - 33 J.-J. Hublin, ”The origin of Neanderthals”, *PNAS* 106 (2009), 16,022–7.
 - 34 A. Bartsios ja J.-L. Arsuaga, ”Hibernation in hominins from Atapuerca, Spain half a million years ago”, *L'Anthropologie* 124 (2020), 1–34.
 - 35 M. Conde-Valverde et al., ”Neanderthals and *Homo sapiens* had similar auditory and speech capacities”, *Nature Ecology & Evolution* (2021), 1–19.
 - 36 D. Garrigan ja M. Hammer, ”Reconstructing human origins in the genomic era”, *Nature Reviews Genetics* 7 (2006), 669–80.
 - 37 M. Lahr, ”Genetic and Fossil Evidence for Modern Human Origins”, teoksessa P. Mitchell ja P. Lane (toim.), *The Oxford Handbook of African Archaeology* (Oxford, 2013), 327–9.
 - 38 C. Stringer, *The Origins of our Species* (Lontoo, 2012), 173–4, 229–33; A. Timmermann et al., ”Climate effects on archaic human habitats and species successions”, *Nature* 604 (2022), 495–501.
 - 39 Y. Kedar, G. Kedar ja R. Barkai, ”The influence of smoke density on hearth location and activity areas at Lower Paleolithic Lazaret Cave, France”, *Scientific Reports* 12 (2022), 1–14.
 - 40 E. Böhm et al., ”Strong and deep Atlantic meridional overturning circulation during the last glacial cycle”, *Nature* 517 (2015), 73–6; D. Sigman, M. Hain ja G. Haug, ”The polar ocean and glacial cycles in atmospheric CO₂ concentration”, *Nature* 466 (2010), 47–55.

- 41 J. Bassis, S. Petersen ja L. MacCathles, "Heinrich events triggered by ocean forcing and modulated by isostatic adjustment", *Nature* 542 (2017), 332–4.
- 42 S. Crump et al., "Ancient plant DNA reveals High Arctic greening during the Last Interglacial", *PNAS* 118 (2021).
- 43 C. Turney et al., "Early Last Interglacial ocean warming drove substantial ice mass loss from Antarctica", *PNAS* 117 (2020), 3996–4006.
- 44 R. Jones et al., "Delayed maximum northern European summer temperatures during the Last Interglacial as a result of Greenland Ice Sheet melt", *Geology* 45 (2017), 23–6.
- 45 J. Smith, "Palaeoenvironments of eastern North Africa and the Levant in the Late Pleistocene", teoksessa E. Garcea (toim.), *South-Eastern Mediterranean Peoples between 130,000 and 10,000 Years Ago* (Oxford, 2010), 6–17.
- 46 H. Groucutt et al., "Multiple hominin dispersals into Southwest Asia over the past 400,000 years", *Nature* (2021), 1–15.
- 47 S. Tucci ja J. Akey, "A map of wanderlust", *Nature* 538 (2016), 179–80.
- 48 R. Dennell ja W. Roebroeks, "An Asian perspective on early human dispersals from Africa", *Nature* 438 (2005), 1099–104; J. Saarinen, "Pliocene to Middle Pleistocene climate history in the Guadix-Baza Basin, and the environmental conditions of early *Homo* dispersal in Europe", *Quaternary Science Reviews* 268 (2021), 1–18; M. Belmaker, "On the road to China: the environmental landscape of the Early Pleistocene in Western Eurasia and its implication for the dispersal of *Homo*", teoksessa C. Norton ja D. R. Braun (toim.), *Asian Palaeoanthropology: From Africa to China and Beyond*, Vertebrate Palaeobiology and Palaeoanthropology (Lontoo, 2011), 31–40.
- 49 J. Shea, "Transitions or turnovers? Climatically-forced extinctions of *Homo sapiens* and Neanderthals in the East Mediterranean Levant", *Quaternary Science Reviews* 27 (2008), 2253–70.
- 50 W. Rose ja C. Chesner, "Dispersal of ash in the great Toba eruption, 75 ka", *Geology* 15 (1987), 913–17.
- 51 M. Williams et al., "Environmental impact of the 73 Ka Toba super-eruption in South Asia", *Palaeogeography, Palaeoclimatology, Palaeoecology* 284 (2009), 295–314.
- 52 A. Robock et al., "Did the Toba Volcanic Eruption of ~74k BP produce Widespread Glaciation?", *Journal of Geophysical Research* 114 (2009), 1–9; S. Ambrose, "Late Pleistocene Human Population Bottlenecks, Volcanic Winter, and Differentiation of Modern Humans", *Journal of Human Evolution* 34 (1998), 623–51.

- 53 B. Black et al., "Global climate disruption and regional climate shelters after the Toba supereruption", *PNAS* 118 (2021), 1–8.
- 54 C. Lane, B. Chorn ja T. Johnson, "Ash from the Toba supereruption in Lake Malawi shows no volcanic winter in East Africa at 75ka", *PNAS* 110 (2013), 8025–9.
- 55 M. Haslam et al., "The 74 ka Toba super-eruption and southern Indian hominins: archaeology, lithic technology and environments at Jwalapuram Locality 3", *Journal of Archaeological Science* 37 (2010), 3370–84.
- 56 C. Timmreck et al., "Aerosol size confines climate response to volcanic super-eruptions", *Geophysical Research Letters* 37 (2010), 1–5.
- 57 C. Fernandes et al., "Absence of Post-Miocene Red Sea Land Bridges: Biogeographic Implications", *Journal of Biogeography* 33 (2006), 961–6; C. Clarkson et al., "Human Occupation of Northern Australia by 65,000 Years Ago", *Nature* 547 (2017), 306–10.
- 58 J. Thompson et al., "Early human impacts and ecosystem reorganization in southern-central Africa", *Science Advances* 7 (2021), 1–13.
- 59 M. Ziegler et al., "Development of Middle Stone Age innovation linked to rapid climate change", *Nature Communications* 4 (2013), 1–9.
- 60 F. d'Errico et al., "Nassarius kraussianus shell beads from Blombos Cave: evidence for symbolic behaviour in the Middle Stone Age", *Journal of Human Evolution* 48 (2005), 3–24.
- 61 R. Vogelsang, "New Excavations of Middle Stone Age Deposits at Apollo 11 Rockshelter, Namibia: Stratigraphy, Archaeology, Chronology and Past Environments", *Journal of African Archaeology* 8 (2010), 185–218.
- 62 Y. Sahle ja A. Brooks, "Assessment of complex projectiles in the early Late Pleistocene at Aduma, Ethiopia", *PLOS ONE* 14 (2019), 1–18.
- 63 J. Shea, "Neanderthals and early *Homo sapiens* in the Levant", teoksessa Garcea, *South-Eastern Mediterranean Peoples*, 126–43.
- 64 J. Miller ja Y. Wang, "Ostrich eggshell beads reveal 50,000-year-old social network in Africa", *Nature* 601 (2022), 234–9.
- 65 D. Leder, "A 51,000-year-old engraved bone reveals Neanderthals' capacity for symbolic behaviour", *Nature Ecology & Evolution* 5 (2021), 1273–82; A. Pitarch Martí, "The symbolic role of the underground world among Middle Paleolithic Neanderthals", *PNAS* 118 (2021), 1–6.
- 66 C. Henshilwood, F. d'Errico ja I. Watts, "Engraved ochres from the Middle Stone Age level at Blombos Cave, South Africa", *Journal of Human Evolution* 57 (2009), 27–47.

- 67 A. Brumm, "Oldest cave art found in Sulawesi", *Science Advances* 7 (2021), 1–13.
- 68 M. Aubert, "Earliest hunting scene in prehistoric art", *Nature* 576 (2019), 442–5; asutuksen ajoittamisesta Euroopassa H. Fewlass, "A ^{14}C chronology for the Middle to Upper Palaeolithic transition at Bacho Kiro Cave, Bulgaria", *Nature Ecology & Evolution* 4 (2020), 794–801.
- 69 J. Kind et al., "The smile of the Lion Man: Recent excavations in Stadel Cave (Baden-Württemberg, south-western Germany) and the restoration of the famous Upper Palaeolithic figurine", *Quartär* 61 (2014), 129–45.
- 70 A. Cooper et al., "A global environmental crisis 42,000 years ago", *Science* 371 (2021), 811–18; ks. myös A. Picin et al., "Comment on 'A global environmental crisis 42,000 years ago'", *Science* 374 (2021), 1–4.
- 71 Y. Kedar, G. Kedar ja R. Barkai, "Hypoxia in Paleolithic decorated caves: the use of artificial light in deep caves reduces oxygen concentration and induces altered states of consciousness", *Time and Mind: The Journal of Archaeology, Consciousness and Culture* 14 (2021), 1–36.
- 72 D. Wolf et al., "Climate deteriorations and Neanderthal demise in interior Iberia", *Scientific Reports* 8 (2018), 1–10; S. Pederzani, "Subarctic climate for the earliest *Homo sapiens* in Europe", *Science Advances* 7 (2021), 1–10.
- 73 A. Timmermann, "Quantifying the potential causes of Neanderthal extinction: Abrupt climate change versus competition and interbreeding", *Quaternary Science Reviews* 238 (2020), 1–14; L. Slimak et al., "Modern human incursion into Neanderthal territories 54,000 years ago at Mandrin, France", *Science Advances* 8 (2022), 1–16.
- 74 P. Mellars ja J. French, "Tenfold Population Increase in Western Europe at the Neanderthal-to-Modern Human Transition", *Science* 333 (2011), 623–7.
- 75 Y. Kaifu, "Archaic hominin populations in Asia before the arrival of modern humans: their phylogeny and implications for 'Southern Denisovans'", *Current Anthropology* 58 (2017), 418–33.
- 76 P. Roberts et al., "Isotopic evidence for initial coastal colonization and subsequent diversification in the human occupation of Wallacea", *Nature Communications* 11 (2020), 1–11; ks. myös N. Bourgon, "Trophic ecology of a Late Pleistocene early modern human from tropical Southeast Asia inferred from zinc isotopes", *Journal of Human Evolution* 161 (2021), 1–10.
- 77 J. Choin et al., "Genomic insights into population history and biological adaptation in Oceania", *Nature* 592 (2021), 583–9; A. Fairbairn,

- "Pleistocene Occupation of New Guinea's Highland and Subalpine Environments", *World Archaeology* 38 (2017), 371–86.
- 78 Clarkson et al., "Human Occupation of Northern Australia by 65,000 Years Ago", 306–10; S. Florin et al., "Pandanus nutshell generates a palaeoprecipitation record for human occupation at Madjedbebe, northern Australia," *Nature Ecology & Evolution* 5 (2021), 295–303.
- 79 P. Clark et al., "The Last Glacial Maximum", *Science* 325 (2009), 710–14.
- 80 F. Sirocko, *Wetter, Klima, Menschheitssentwicklung: von der Eiszeit bis ins 21. Jahrhundert* (Darmstadt, 2010), erityisesti 71–82.
- 81 S. Blockley et al., "Dating human occupation and adaptation in the southern European last glacial refuge: The chronostratigraphy of Grotta del Romito (Italy)", *Quaternary Science Reviews* 184 (2018), 5–25.
- 82 G.-C. Weniger, "Late Glacial rapid climate change and human response in the Westernmost Mediterranean (Iberia and Morocco)", *PLOS ONE* 14 (2019), 1–33.
- 83 C. Spötl et al., "Increased autumn and winter precipitation during the Last Glacial Maximum in the European Alps", *Nature Communications* 12 (2021), 1–9.
- 84 R. Cheddadi et al., "Putative glacial refugia of *Cedus atlantica* deduced from Quaternary pollen records and modern genetic diversity", *Journal of Biogeography* 36 (2009), 1361–71; K. Cuffey et al., "Large arctic temperature change at the Wisconsin-Holocene transition", *Science* 270 (1995), 455–8.
- 85 A. Seltzer et al., "Widespread six degrees Celsius cooling on land during the Last Glacial Maximum", *Nature* 593 (2021), 228–32.
- 86 P. Wang ja X. Sun, "Last glacial maximum in China: comparison between land and sea", *Catena* 23 (1994), 341–53.
- 87 P. Zhao et al., "Modeling the East Asian climate during the last glacial maximum", *Science in China Series D: Earth Sciences* 46 (2003), 1060–8.
- 88 A. Bouzouggar, R. Barton ja S. Blockley, "Re-evaluating the age of the Iberomaurusian in Morocco", *African Archaeological Review* 25 (2008), 3–19.
- 89 Mercader et al., "Phytoliths from archaeological sites in the tropical forest of Ituri, Democratic Republic of Congo", *Quaternary Research* 54 (2000), 102–12.
- 90 J. Louys ja P. Roberts, "Environmental drivers of megafauna and hominin extinction in South East Asia", *Nature* 586 (2020), 402–24; H. Bocherens et al., "Flexibility of diet and habitat in Pleistocene

- South Asian mammals: Implications for the fate of the giant fossil ape *Gigantopithecus*”, *Quaternary International* 434 (2017), 148–55.
- 91 A. Barnosky, ”Assessing the Causes of Late Pleistocene Extinctions on the Continents”, *Science* 306 (2004), 70–5; C. Bradshaw et al., ”Relative demographic susceptibility does not explain the extinction chronology of Sahul’s megafauna”, *ELife* (2021), 1–43; J. Cantalapiedra et al., ”The rise and fall of proboscidean ecological diversity”, *Nature Ecology & Evolution* 5 (2021), 1266–72.
 - 92 G. Prescott et al., ”Quantitative global analysis of the role of climate and people in explaining late Quaternary megafaunal extinctions”, *PNAS* 109 (2012), 4257–31.
 - 93 C. Sandom et al., ”Global late Quaternary megafauna extinctions linked to humans, not climate change”, *Proceedings of the Royal Society B* 281 (2014), 1–9.
 - 94 N. Munro et al., ”The emergence of animal management in the southern Levant”, *Scientific Reports* 8 (2018), 1–11; J. Dembitzer et al., ”Levantine overkill: 1.5 million years of hunting down the body size distribution”, *Quaternary Science Reviews* 276 (2022), 1–10.
 - 95 D. Lorenzen et al., ”Species-specific responses of Late Quaternary megafauna to climate and humans”, *Nature* 479 (2011), 359–64.
 - 96 C. Doughty et al., ”Megafauna extinction, tree species range reduction, and carbon storage in Amazonian forests”, *Ecography* 39 (2016), 194–203.
 - 97 S. Rule et al., ”The Aftermath of Megafaunal Extinction: Ecosystem Transformation in Pleistocene Australia”, *Science* 335 (2012), 1483–6.
 - 98 T. Pico et al., ”Glacial isostatic adjustment directed incision of the Channeled Scabland by Ice Age megafloods”, *PNAS* 119 (2022), 1–6.
 - 99 P. Clark, ”Global climate evolution during the last deglaciation”, *PNAS* 109 (2012), 1134–42.
 - 100 J. Benjamin, ”Aboriginal artefacts on the continental shelf reveal ancient drowned cultural landscapes in northwest Australia”, *PLOS ONE* 15 (2020), 1–31.
 - 101 A. Williams, ”Sea-level change and demography during the last glacial termination and early Holocene across the Australian continent”, *Quaternary Science Reviews* 182 (2018), 144–54.
 - 102 G. Goebel, M. Waters ja D. O’Rourke, ”The Late Pleistocene Dispersal of Modern Humans in the Americas”, *Science* 319 (2008), 1497–1502; J. Dobson, G. Spada ja G. Galassi, ”The Bering Transitory Archipelago: stepping stones for the first Americans”, *Comptes Rendus Géoscience* 353 (2021), 55–65.

- 103 V. Moreno-Mayar, "Early human dispersals within the Americas", *Science* 362 (2018), 1–II.
- 104 Ks. esim. W. Stinnesbeck, "The earliest settlers of Mesoamerica date back to the late Pleistocene", *PLOS ONE* 12 (2017), 1–20; M. Araújo Castro e Silva et al., "Deep genetic affinity between coastal Pacific and Amazonian natives evidenced by Australasian ancestry", *PNAS* 118 (2021), 1–3.
- 105 C. Ardelean et al., "Evidence of human occupation in Mexico around the Last Glacial Maximum", *Nature* 584 (2020), 87–92; A. Somerville, I. Casar ja J. Arroyo-Cabral, "New AMS Radiocarbon Ages from the Preceramic Levels of Coxcatlan Cave, Puebla, Mexico: A Pleistocene Occupation of the Tehuacan Valley", *Latin American Antiquity* (2021), 1–15; T. Rowe et al., "Human Occupation of the North American Colorado Plateau ~37,000 Years Ago", *Frontiers in Ecology and Evolution* 10 (2022), 1–22.
- 106 J. Colella, "Whole-genome resequencing reveals persistence of forest-associated mammals in Late Pleistocene refugia along North America's North Pacific coast", *Journal of Biogeography* 48 (2021), 1153–9.
- 107 Ks. esim. L. Bourgeon, A. Burke ja T. Higham, "Earliest human presence in North America dates to the Last Glacial Maximum: new radiocarbon dates from Bluefish Caves, Canada", *PLOS ONE* 12 (2017), 1–15; T. Dillehay et al., "New Archaeological Evidence for an Early Human Presence at Monte Verde, Chile", *PLOS ONE* 10 (2015), 1–27; A. Campelo dos Santos et al., "Genomic evidence for ancient human migration routes along South America's Atlantic coast", *Proceedings of the Royal Society B, Biological Sciences* 289 (2022), 1–II.
- 108 D. Shakun ja A. Carlson, "A global perspective on Last Glacial Maximum to Holocene Climate Change", *Quaternary Science Reviews* 29 (2010), 1801–16.
- 109 J. Annan ja J. Hargreaves, "A new global reconstruction of temperature changes at the Last Glacial Maximum", *Climate of the Past* 9 (2013), 367–76; P. Holden et al., "A probabilistic calibration of climate sensitivity and terrestrial carbon change in GENIE-I", *Climate Dynamics* 35 (2009), 1–22.
- 110 N. Thiagarajan et al., "Abrupt pre-Bølling-Allerød warming and circulation changes in the deep ocean", *Nature* 511 (2014), 75.
- III W. van Ziest, U. Baruch ja S. Bottema, "Holocene palaeoecology of the Hula area, northern Israel", teoksessa E. Kaptijn ja L. Petit (toim.), *A Timeless Vale: Archaeological and Related Essays on the Jordan Valley in*

- Honour of Gerrit van der Kooij on the Occasion of his Sixty-Fifth Birthday* (Leiden, 2009), 29–64.
- 112 N. Goring Morris ja A. Belfer-Cohen, "Neolithization processes in the Levant: the outer envelope", *Current Anthropology* 52 (2011), 195–208.
 - 113 C. Nolan et al., "Past and future global transformation of terrestrial ecosystems under climate change", *Science* 361 (2018), 920–3.
 - 114 C. Parmesan ja M. Hanley, "Plants and climate change: complexities and surprises", *Annals of Botany* 116 (2015), 849–64.
 - 115 Ibid.; V. Masson-Delmotte et al., "Information from paleoclimatic archives", teoksessa T. Stocker et al. (toim.), *Climate Change 2013 – The Physical Science Basis* (Cambridge, 2013), 383–464.
 - 116 A. Carlson et al., "Geochemical proxies of North American freshwater routing during the Younger Dryas cold event", *PNAS* 104 (2007), 6556–61.
 - 117 G. Brakenridge, "Core-collapse supernovae and the Younger Dryas/terminal Rancholabrean extinctions", *Icarus* 215 (2011), 101–6.
 - 118 F. Thackeray, L. Scott ja P. Pieterse, "The Younger Dryas interval at Wonderkrater (South Africa) in the context of a platinum anomaly", *Palaeontologia Africana* 54 (2019), 30–5; M. Sweatman, "The Younger Dryas impact hypothesis: Review of the impact evidence", *Earth-Science Reviews* 218 (2021), 1–22.
 - 119 N. Sun, "Volcanic origin for Younger Dryas geochemical anomalies ca. 12,000 cal BP", *Science Advances* 6 (2020), 1–9. Ajoittamiseen liittyen ks. F. Reinig et al., "Precise date for the Laacher See eruption synchronises the Younger Dryas", *Nature* 595 (2021), 66–9.
 - 120 P. Schultz et al., "Widespread glasses generated by cometary fireballs during the late Pleistocene in the Atacama Desert, Chile", *Geology* (2021), 1–5.
 - 121 J. Steffensen et al., "High-Resolution Greenland Ice Core Data Show Abrupt Climate Change Happens in Few Years", *Science* 321 (2008), 680–4.
 - 122 J. Fan et al., "The manifestation of the Younger Dryas event in the East Asian summer monsoon margin: New evidence from carbonate geochemistry of the Dali Lake sediments in northern China", *The Holocene* 28 (2018), 1082–92.
 - 123 R. Newnham ja D. Lowe, "Fine-resolution pollen record of late-glacial climate reversal from New Zealand", *Geology* 28 (2000), 759–62.
 - 124 J. Bakke et al., "Rapid oceanic and atmospheric changes during the Younger Dryas cold period", *Nature Geoscience* 2 (2009), 202–5.

- 125 Z. An, S. Colman ja W. Zhou, "Interplay between the Westerlies and Asian monsoon recorded in Lake Qinghai sediments since 32 ka", *Scientific Reports* 2 (2012), 1–7; X. Huang, P. Meyers ja J. Yu, "Moisture conditions during the Younger Dryas and the early Holocene in the middle reaches of the Yangtze River, central China", *The Holocene* 22 (2012), 1473–9.
- 126 M. Talbot et al., "An abrupt change in the African monsoon at the end of the Younger Dryas", *Geochemistry, Geophysics, Geosystems* 8 (2007), 1–16.
- 127 R. Guthrie, "New carbon dates link climate change with human colonization and Pleistocene extinctions", *Nature* 441 (2006), 207–9; ks. myös J. Louys, "No evidence for widespread island extinctions after Pleistocene hominin arrival", *PNAS* 118 (2021), 1–8.
- 128 M. Theuerkauf ja H. Joosten, "Younger Dryas cold stage vegetation patterns of central Europe – climate, soil and relief controls", *Boreas* 41 (2012), 391–407; F. Mayle ja L. Cwynar, "Impact of the Younger Dryas Cooling Event upon Lowland Vegetation of Maritime Canada", *Ecological Monographs* 65 (1995), 129–54; S. Mulitza et al., "Sahel megadroughts triggered by glacial slowdowns of Atlantic meridional overturning", *Paleoceanography* 23 (2008), 1–11.
- 129 D. Anderson et al., "Multiple lines of evidence for possible Human population decline/settlement reorganization during the early Younger Dryas", *Quaternary International* 242 (2011), 570–83.
- 130 J. Fernández-López de Pablo et al., "Palaeodemographic modelling supports a population bottleneck during the Pleistocene–Holocene transition in Iberia", *Nature Communications* 10 (2019), 1–13.
- 131 Y. Nakazawa et al., "Human responses to the Younger Dryas in Japan", *Quaternary International* 242 (2011), 416–33.
- 132 A. Belfer-Cohen ja O. Bar-Yosef, "Early sedentism in the Near East: a bumpy ride to village life", teoksessa I. Kujit (toim.), *Life in Neolithic Farming Communities: Social Organization, Identity and Differentiation* (New York, 2000), 19–37.
- 133 H. Cheng et al., "Timing and structure of the Younger Dryas event and its underlying climate dynamics", *PNAS* 117 (2020), 23,408–17; J. Partin et al., "Gradual onset and recovery of the Younger Dryas abrupt climate event in the tropics", *Nature Communications* 6 (2015), 1–9.
- 134 Steffensen, "High-Resolution Greenland Ice Core Data", 680–4.
- 135 M. Walker, "Formal definition and dating of the GSSP (Global Stratotype Section and Point) for the base of the Holocene using the

- Greenland NGRIP ice core, and selected auxiliary records”, *Journal of Quaternary Science* 24 (2009), 3–17.
- 136 S. Raghuraman, D. Paynter ja V. Ramaswamy, ”Anthropogenic forcing and response yield observed positive trend in Earth’s energy imbalance”, *Nature Communications* 12 (2021), 1–10.
- 137 N. Barton ja A. Bouzougar, ”Hunter-gatherers of the Maghreb 25,000–6,000 Years Ago”, teoksessa Mitchell ja Lane (toim.), *Oxford Handbook of African Archaeology*, 432–4.
- 138 E. Rybin et al., ”Стратиграфия и культурная последовательность стоянки Толбор-21 (Северная Монголия): итоги работ 2014–2016 гг. И дальнейшие перспективы исследований” teoksessa Теория и практика археологических исследований 20 (2017), 15,868; E. Novgorodova, Древняя Монголия: Некоторые проблемы хронологии и этнокультурной истории (Moskova, 1989).
- 139 L. Humphrey ja E. Bocaege, ”Tooth Evulsion in the Maghreb: Chronological and Geographical Patterns”, *African Archaeological Review* 25 (2008), 109–23. Varhaisimman ihmisen hautaanisesta on ajotettu tapahtuneen noin 78 000 vuotta sitten kenialaisessa luolassa: M. Martinón-Torres, ”Earliest known human burial in Africa”, *Nature* 593 (2021), 95–100; N. Rahmani, *Le Capsien typique et le Capsien supérieur. Evolution ou contemporanéité, les données technologiques* (Oxford, 2003), ks. erityisesti 291–301.
- 140 G. Barker, *The Agricultural Revolution in Prehistory: Why Did Foragers Become Farmers?* (Oxford, 2006); L. Janz, D. Odsuren ja D. Bukhchulun, ”Transitions in Palaeoecology and Technology: Hunter-Gatherers and Early Herders in the Gobi Desert”, *Journal of World Prehistory* 30 (2017), 1–80.
- 141 A. Rosen ja I. Rivera-Collazo, ”Climate change, adaptive cycles and the persistence of foraging economies during the late Pleistocene/Holocene transition in the Levant”, *PNAS* 109 (2012), 3640–5; G. Wilcox, ”The distribution, natural habitats and availability of wild cereals in relation to their domestication in the Near East: Multiple events, multiple centres”, *Vegetation History and Archaeobotany* 14 (2005), 534–41.
- 142 O. Bar-Yosef ja A. Belfer-Cohen, ”Facing environmental crisis. Societal and cultural changes at the transition from the Younger Dryas to the Holocene in the Levant”, teoksessa R. Cappers ja S. Bottema, *Transition from Foraging to Farming in South-West Asia: Dawn of Farming in the Near East* (Berliini, 2002), 55–66.
- 143 E. Ellis et al., ”People have shaped most of territorial nature for at least 12,000 years”, *PNAS* 118 (2021), 1–8.

- 144 M. Maslin, C. Stickley ja V. Ettwein, "Holocene Climate Variability", teoksessa K. Cochran et al. (toim.), *Encyclopaedia of Ocean Sciences*, 6 vols (Amsterdam, 2019), 4, 513–19.
- 145 Dasgupta Review, 2.

IHMINEN JÄTTÄÄ KÄDENJÄLKENSÄ EKOSYSTEEMEIHIIN

- 1 P. Richerson, R. Boyd ja R. Bettinger, "Was Agriculture Impossible during the Pleistocene but Mandatory during the Holocene? A Climate Change Hypothesis", *American Antiquity* 66 (2001), 387–411.
- 2 Z. Qiu et al., "Late Pleistocene–Holocene vegetation history and anthropogenic activities deduced from pollen spectra and archaeological data at Guxu Lake, eastern China", *Scientific Reports* 10 (2020), 1–14.
- 3 E. Duarte et al., "A progressively wetter early through middle Holocene climate in the eastern lowlands of Guatemala", *Earth and Planetary Science Letters* 561 (2021), 1–13.
- 4 H.-S. Park et al., "Mid-Holocene Northern Hemisphere warming driven by Arctic amplification", *Science Advances* 5 (2019), 1–11.
- 5 S. Höpker et al., "Pronounced northwest African monsoon discharge during the mid- to late-Holocene", *Frontiers in Earth Science* 7 (2019), 1–17.
- 6 R. Cheddadi et al., "Early Holocene greening of the Sahara required Mediterranean winter rainfall", *PNAS* 118 (2021), 1–7.
- 7 N. Roberts et al. "Human responses and non-responses to climatic variations during the last Glacial–Interglacial transition in the eastern Mediterranean", *Quaternary Science Reviews* 184 (2018), 47–67.
- 8 A. Moore ja G. Hillman, "The Pleistocene to Holocene transition and human economy in southwest Asia: the impact of the younger Dryas", *American Antiquity* 57 (1992), 482–94.
- 9 Rosen ja Rivera-Collazo, "Climate change", 3640–5.
- 10 K. Wright, "The Social Origins of Cooking and Dining in Early Villages of Western Asia", *Proceedings of the Prehistoric Society* 66 (2000), 89–121.
- 11 T. Molleson, "The Eloquent Bones of Any Hureyra", *Scientific American* 271 (1994), 60–5; T. Molleson, "Bones of Work at the Origins of Labour", teoksessa S. Hamilton, R. Whitehouse ja K. Wright (toim.), *Archaeology and Women: Ancient and Modern Issues* (Walnut Creek, CA, 2007), 185–98.
- 12 Y. Garfinkel, *Dancing at the Dawn of Agriculture* (Austin, TX, 2003).
- 13 A. Macintosh, R. Pinhasi ja J. Stock, "Prehistoric women's manual labor exceeded that of athletes through the first 5500 years of farming in Central Europe", *Science Advances* 3 (2017), 1–12; A. Macintosh, R. Pinhasi ja J. Stock, "Lower limb skeletal biomechanics track long-term

- decline in mobility across ~6150 years of agriculture in Central Europe”, *Journal of Archaeological Science* 52 (2014), 376–90.
- 14 J. Peterson, *Sexual Revolutions: Gender and Labor at the Dawn of Agriculture* (Walnut Creek, CA, 2002); D. Bolger, ”The Dynamics of Gender in Early Agricultural Societies of the Near East”, *Signs* 35 (2010), 503–31.
 - 15 O. Bar Yosef, ”Facing climatic hazards: Palaeolithic foragers and Neolithic farmers”, *Quaternary International* 428 (2017), 64–72; K. Daly et al., ”Hherded and hunted goat genomes from the dawn of domestication in the Zagros Mountains”, *PNAS* 118 (2021), 1–9.
 - 16 S. Colledge, J. Conolly ja S. Shennan, ”Archaeobotanical Evidence for the Spread of Farming in the Eastern Mediterranean”, *Current Anthropology* 45 (2004), 35–58.
 - 17 M. Zeder, ”The Origins of Agriculture in the Near East”, *Current Anthropology* 52 (2011), 221–35.
 - 18 B. Smith, ”Low-Level Food Production”, *Journal of Archaeological Research* 9 (2001), 1–43.
 - 19 C. Doughty, ”The development of agriculture in the Americas: an ecological perspective”, *Ecosphere* 1 (2010), 1–11.
 - 20 Z. Zhao, ”New Archaeobotanic Data for the Study of the Origins of Agriculture in China”, *Current Anthropology* 52 (2011), 295–306.
 - 21 D. Cohen, ”The Beginnings of Agriculture in China: A Multiregional View”, 52 (2011), 273–94.
 - 22 F. Bocquentin, ”Pour une approche anthropologique de la transition Épipaléolithique-Néolithique au Proche-Orient”, *Bulletin du Centre de Recherche Français à Jérusalem* 17 (2006), 41–51; E. Schotsmans et al., ”New insights on commemoration of the dead through mortuary and architectural use of pigments at Neolithic Çatalhöyük, Turkey”, *Scientific Reports* 12 (2022), 1–19.
 - 23 N. Ezgi Altınışık et al., ”A genomic snapshot of demographic and cultural dynamism in Upper Mesopotamia during the Neolithic Transition”, *Science Advances* 8 (2022), 1–17.
 - 24 H. Hauptmann ja K. Schmidt, ”Anatolien vor 12.000 Jahren. Die Skulpturen des Frühneolithikums”, Badenin valtionmuseossa Karlshruhessa, *Vor 12.000 Jahren in Anatolien. Die ältesten Monamente der Menschheit* (Karlsruhe, 2007), 67–73.
 - 25 O. Dietrich et al., ”The role of cult and feasting in the emergence of Neolithic communities: new evidence from Göbekli Tepe”, *Antiquity* 86 (2012), 674–95; H. Hauptmann, ”Eine frühneolithische Kultfigur aus Urfa”, teoksessa U. Esin et al. (toim.), *Köyden Kente: yakindoğu'da ilk yerleşimler* (Istanbul, 2003), 623–6; M. Zhilin et al., ”Early art in the

- Urals: new research on the wooden sculpture from Shigir”, *Antiquity* 92 (2018), 334–50.
- 26 H. Thomas et al., ”The mustatils: cult and monumentality in Neolithic north-western Arabia”, *Antiquity* (2021), 1–22.
 - 27 R. Rainio et al., ”Prehistoric Pendants as Instigators of Sound and Body Movements: A Traceological Case Study from Northeast Europe, c.8200 cal BP”, *Cambridge Archaeological Journal* 31 (2021), 639–60.
 - 28 S. Bowles ja J.-K. Choi, ”Coevolution of farming and private property during the early Holocene”, *PNAS* 110 (2013), 8830–5.
 - 29 A. Goring-Morris ja A. Belfer-Cohen, ”A Roof over One’s Head: Developments in Near Eastern Residential Architecture across the Epipalaeolithic–Neolithic Transition”, teoksessa J. Boquet-Appel ja O. Bar-Yosef (toim.), *The Neolithic Demographic Transition and its Consequences* (Dordrecht, 2008), 239–86.
 - 30 W. Van Neer et al., ”Aquatic fauna from the Takarkori rock shelter reveals the Holocene central Saharan climate and palaeohydrography”, *PLOS ONE* 15 (2020), 1–34.
 - 31 B. Barich, ”Hunter-Gatherer-Fishers of the Sahara and the Sahel 12,000–4,000 Years Ago”, teoksessa Mitchell ja Lane (toim.), *Oxford Handbook of African Archaeology*, 449.
 - 32 R. Bettinger et al., ”The transition to agriculture in northwestern China”, *Developments in Quaternary Sciences* 9 (2007), 83–101.
 - 33 K. Prufer et al., ”Linking late Paleoindian stone tool technologies and populations in North, Central and South America”, *PLOS ONE* 14 (2019), 1–20.
 - 34 A. Luquin et al., ”Ancient lipids document continuity in the use of early hunter-gatherer pottery through 9,000 years of Japanese prehistory”, *PNAS* 113 (2016), 3991–6.
 - 35 J. Roset, ”Céramique et néolithisation en Afrique saharienne”, teoksessa J. Guilaine (toim.), *Premiers Paysans du monde: naissances des agricultures* (Pariisi, 2000), 263–90; E. Huysecom et al., ”Ounjougou (Mali): a history of Holocene settlement at the southern edge of the Sahara”, *Antiquity* 78 (2004), 579–93.
 - 36 Barich, ”Hunter-Gatherer-Fishers”, 447–8.
 - 37 R. Haaland ja G. Haaland, ”Early Farming Societies along the Nile”, teoksessa Mitchell ja Lane (toim.), *Oxford Handbook of African Archaeology*, 541–53.
 - 38 O. Nieuwenhuyse, M. Daskiewicz ja G. Schneider, ”Investigating Late Neolithic ceramics in the northern Levant: the view from Shir”, *Levant* (2018), 1–20.

- 39 S. Shoda, "Pottery use by early Holocene hunter-gatherers of the Korean peninsula closely linked with exploitation of marine resources", *Quaternary Science Reviews* 170 (2017), 164–73.
- 40 E. Weiss, M. Kislev ja A. Hartmann, "Autonomous cultivation before domestication", *Science* 312 (2006), 1608–10.
- 41 F. Borrell, A. Junno ja J. Barceló, "Synchronous Environmental and Cultural Change in the Emergence of Agricultural Economies 10,000 Years Ago in the Levant", *PLOS ONE* 10 (2015), 1–19.
- 42 Bar-Yosef, "Facing climatic hazards", 69; P. Roscoe, "Settlement fortification in village and 'tribal' society: evidence from contact-era New Guinea", *Journal of Anthropological Archaeology* 27 (2008), 507–19.
- 43 A. Palmisano et al., "Holocene regional population dynamics and climatic trends in the Near East: A first comparison using archaeo-demographic proxies", *Quaternary Science Reviews* 252 (2021), 1–27.
- 44 J. Bocquet-Appel ja S. Naji, "Testing the hypothesis of a worldwide Neolithic demographic transition: Corroboration from American cemeteries", *Current Anthropology* 47 (2006), 341–64.
- 45 E. Page et al., "Reproductive trade-offs in extant hunter-gatherers suggest adaptive mechanism for the Neolithic expansion", *PNAS* 113 (2016), 4694–9.
- 46 Ibid.; E. Herrera, "Metabolic adaptations in pregnancy and their implications for the availability of substrates to the fetus", *European Journal of Clinical Nutrition* 54 (2000), 47–51.
- 47 R. McLaughlin et al., "Late Glacial and Early Holocene human demographic responses to climatic and environmental change in Atlantic Iberia", *Proceedings of the Royal Society B* 376 (2020), 1–8.
- 48 J. Brooke, *Climate Change and the Course of Global History: A Rough Journey* (New York, 2014), 220.
- 49 J. Lukacs, "Sex differences in dental caries rates with the origin of agriculture in South Asia", *Current Anthropology* 37 (1996), 147–53; J. Lukacs ja L. Largaespada, "Explaining sex differences in dental caries rates: Saliva, hormones and 'life history' etiologies", *American Journal of Human Biology* 18 (2006), 540–55.
- 50 Brooke, *Climate Change*, 202.
- 51 A. Masclans et al., "A sexual division of labour at the start of agriculture? A multi-proxy comparison through grave good stone tool technological and use-wear analysis", *PLOS One* 16 (2021), 1–41.
- 52 Brooke, *Climate Change*, 192–3.
- 53 Bolger, "Dynamics of Gender", 503–31; Masclans, "Sexual division of labour", 1–41.

- 54 Page, "Reproductive trade-offs", 4694.
- 55 G. Fournié, D. Pfeiffer ja R. Bendrey, "Early animal farming and zoonotic disease dynamics: modelling brucellosis transmission in Neolithic goat populations", *Royal Society Open Science* 4 (2017), 1–11; E. Dounias ja A. Froment, "When forest-based hunter-gatherers become sedentary: consequences for diet and health", *Unasylva* 224 (2006), 26–33.
- 56 J. Webb, "Climate, Ecology and Infectious Human Disease", teoksessa White, Pfister ja Mauelshagen (toim.), *Palgrave Handbook of Climate History*, 358.
- 57 W. McNeill, *Plagues and Peoples* (Oxford, 1977).
- 58 R. McCaa, "Spanish and Nahuatl Views on Smallpox and Demographic Catastrophe in Mexico", *Journal of Interdisciplinary History* 25 (1995), 397–431. Ks. yleisesti A. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, CT, 2003).
- 59 J. Webb, *Humanity's Burden: A Global History of Malaria* (Cambridge, 2009), 18–41; G. Berniell-Lee et al., "Genetic and demographic implications of the Bantu expansion: insights from human paternal lineages", *Molecular Biology and Evolution* 26 (2009), 1581–9.
- 60 Ks. luku "Luonnon ja ihmisten riistämisestä".
- 61 W. Taylor et al., "Evidence for early dispersal of domestic sheep into Central Asia", *Nature Human Behaviour* (2021), 1–11.
- 62 D. Zohary, M. Hopf ja E. Weiss, *Domestication of Plants in the Old World: The Origin and Spread of Domesticated Plants in Southwest Asia, Europe, and the Mediterranean Basin* (Oxford, 2012), 4–5.
- 63 M. Furholt, "Mobility ja Social Change: Understanding the European Neolithic Period after the Archaeogenetic Revolution", *Journal of Archaeological Research* 29 (2021), 1–55.
- 64 I. Lazaridis, "The evolutionary history of human populations in Europe", *Current Opinion in Genetics & Development* 53 (2018), 21–7.
- 65 D. Ju ja I. Mathieson, "The evolution of skin pigmentation-associated variation in West Eurasia", *PNAS* 118 (2021), 1–8.
- 66 N. Crawford et al., "Loci associated with skin pigmentation identified in African populations", *Science* 358 (2017), 1–17.
- 67 P. Richerson ja R. Boyd, "Institutional evolution in the Holocene: the rise of complex societies", teoksessa W. Runciman (toim.), *The Origins of Social Institutions* (Oxford), 218–19. Ks. myös J. Diamond, *Guns, Germs, and Steel* (New York, 1997), 137–8; J. Astini et al., "Predicting Outcrossing in Maize Hybrid Seed Production", *Agronomy Journal* 101 (2009), 373–80.

- 68 S. di Lernia, "The Emergence and Spread of Herding in Northern Africa", teoksessa Mitchell ja Lane (toim.), *Oxford Handbook of African Archaeology*, 527–40.
- 69 D. Fuller, "Finding Plant Domestication in the Indian Subcontinent", *Current Anthropology* 52 (2011), 347–62; B. Smith, "The Cultural Context of Plant Domestication in Eastern North America", *Current Anthropology* 52 (2011), 471–84.
- 70 D. Cohen, "The Beginnings of Agriculture in China", *Current Anthropology* 52 (2011), 273–93.
- 71 R. Bettinger, L. Barton ja C. Morgan, "The Origins of Food Production in North China: A Different Kind of Agricultural Revolution", *Evolutionary Anthropology* 19 (2010), 9–21.
- 72 G. Schmidt ja A. LeGrande, "The Goldilocks abrupt climate change event", *Quaternary Science Reviews* 24 (2005), 1109–10.
- 73 L. Matero et al., "The 8.2 ka cooling event caused by Laurentide ice saddle collapse", *Earth and Planetary Science Letters* 473 (2017), 205–14.
- 74 A. Zerboni ja K. Nicoli, "Enhanced zoogeomorphological processes in arid North Africa on the human-impacted landscape of the Anthropocene", *Geomorphology* 331 (2019), 22–35.
- 75 Y. Dixit et al., "Abrupt weakening of the Indian summer monsoon at 8.2 kyr BP", *Earth and Planetary Science Letters* 391 (2014), 16–23.
- 76 J. Park et al., "The 8.2 ka cooling event in coastal East Asia: High-resolution pollen evidence from southwestern Korea", *Scientific Reports* 8 (2018), 1–9.
- 77 di Lernia, "The Emergence and Spread of Herding in Northern Africa", 534–5.
- 78 Crawford et al., "Loci associated with skin pigmentation", 1–17.
- 79 P. Flohr et al., "Evidence of resilience to past climate change in Southwest Asia: Early farming communities and the 9.2 and 8.2 ka events", *Quaternary Science Reviews* 136 (2016), 23–39.
- 80 M. Brami ja V. Heyd, "The origins of Europe's first farmers: the role of Hacilar and Western Anatolia, fifty years on", *Praehistorische Zeitschrift* 86 (2011), 165–206.
- 81 P. Biehl, "Rapid change versus long-term social change during the Neolithic–Chalcolithic transition in Central Anatolia", *Interdisciplinaria Archaeologica. Natural Sciences in Archaeology* 3 (2012), 75–83.
- 82 M. Roffet-Salque et al., "Evidence for the impact of the 8.2-kyBP climate event on Near Eastern early farmers", *PNAS* 115 (2018), 8705–9. Kasvikuitujen käyttämistä tekstiileihin tällä paikalla noin vuodesta 6 700

- eaa, ks. A. Rast-Eicher, S. Karg ja L. Bender Jørgensen, "The use of local fibres for textiles at Neolithic Çatalhöyük", *Antiquity* 95 (2021), 1129–44.
- 83 I. Hodder (toim.), *Religion in the Emergence of Civilization: Çatalhöyük as a Case Study* (Cambridge, 2010).
- 84 J. van der Plicht et al., "Tell Sabi Abyad, Syria: Radiocarbon chronology, cultural change and the 8.2 ka event", *Radiocarbon* 53 (2011), 229–43.
- 85 O. Nieuwenhuyse et al., "The 8.2 Event in Upper Mesopotamia", teoksessa P. Biehl ja O. Nieuwenhuyse, *Climate and Cultural Change in Prehistoric Europe and the Near East* (Albany, NY, 2016), 67–93.
- 86 P. Bryn et al., "Explaining the Storegga Slide", *Marine and Petroleum Geology* 22 (2005), 11–19.
- 87 V. Gaffney et al., "Multi-proxy evidence for the impact of the Storegga Slide Tsunami on the early Holocene landscapes of the southern North Sea", *Geosciences* 10 (2020), 1–19.
- 88 J. Walker et al., "A great wave: the Storegga tsunami and the end of Doggerland?", *Antiquity* 94 (2020), 1409–25.
- 89 Ks. esim. I. Morris, *Geography is Destiny: Britain and the World, a 10,000 year history* (Lontoo, 2022).
- 90 K. Rydgren ja S. Bondevik, "Moss growth patterns and timing of human exposure to a Mesolithic tsunamic in the North Atlantic", *Geology* 43 (2015), 111–14.
- 91 R. Sutter, "The Pre-Columbian Peopling and Population Dispersals of South America", *Journal of Archaeological Research* 29 (2021), 93–151.
- 92 A. Ortíz, "Dental morphological variation among six pre-Hispanic South American populations", *Dental Anthropology* 26 (2013), 20–32.
- 93 S. Perez et al., "Peopling time, spatial occupation and demography of Late Pleistocene–Holocene human population from Patagonia", *Quaternary International* 425 (2016), 214–23.
- 94 Brooke, *Climate Change*, 175.
- 95 Ibid., 180; I. Usokin et al., "Solar activity during the Holocene: the Hallstatt cycle and its consequence for grand minima and maxima", *Astronomy & Astrophysics* 587 (2016), 1–10.
- 96 Sutter, "Pre-Columbian Peopling and Population Dispersals of South America", 100; M. Carré, "Holocene history of ENSO variance and asymmetry in the eastern tropical Pacific", *Science* 345 (2014), 1045–8.
- 97 K. Cobb et al., "Highly variable El Niño–Southern Oscillation throughout the Holocene", *Science* 339 (2013), 67–70.
- 98 Brooke, *Climate Change*, 177.

- 99 P. DeMenocal et al., "Coherent and low latitude climate variability during the Holocene warm period", *Science* 288 (2000), 2198–202.
- 100 K. Manning ja A. Timpson, "The demographic response to Holocene climate change in the Sahara", *Quaternary Science Reviews* 101 (2014), 28–35.
- 101 S. Kröpelin, "The geomorphological and paleoclimatic framework of prehistoric occupation in the Wadi Bakht area", teoksessa J. Lindstädter (toim.), *Wadi Bakht. Landschaftsarchäologie einer Siedlungskammer im Gilf Kebir, Africa Praehistorica* 18 (2005), 51–65.
- 102 S. di Lernia, "Dry Climatic Events and Cultural Trajectories: Adjusting Middle Holocene Pastoral Economy of the Libyan Sahara", teoksessa F. Hassan (toim.), *Droughts, Food and Culture* (Lontoo, 2002), 225–50.
- 103 S. Höpker et al., "Pronounced Northwest African Monsoon Discharge during the Mid- to Late Holocene", *Frontiers in Earth Science* 7 (2019), 1–17.
- 104 E. D'Atanasio et al., "The peopling of the last Green Sahara revealed by high-coverage resequencing of trans-Saharan patrilineages", *Genome Biology* 19 (2018), 2–15.
- 105 A. Holl, "Dark Side Archaeology: Climate Change and Mid-Holocene Saharan Pastoral Adaptation", *African Archaeological Review* 37 (2020), 491–5.
- 106 B. Shuman et al., "Predictable hydrological and ecological responses to Holocene North Atlantic variability", *PNAS* 116 (2019), 5985–90.
- 107 Y. Zhao, A. Yu ja C. Zhao, "Holocene climatic shifts in north eastern North America", *The Holocene* 20 (2010), 877–86.
- 108 N. Roberts et al., "The mid-Holocene climatic transition in the Mediterranean: Causes and consequences", *The Holocene* 21 (2011), 3–13.
- 109 Y. Huo, W. Peltier ja D. Chandan, "Mid-Holocene in South and Southeast Asia: dynamically downscaled simulations and the influence of the Green Sahara", *Climate of the Past* (2021).
- 110 Z. Feng, C. An ja H. Wang, "Holocene climatic and environmental changes in the arid and semi-arid areas of China: a review", *The Holocene* 16 (2006), 119–30.
- 111 N. Leonard et al., "Holocene sea level instability in the southern Great Barrier Reef, Australia: high-precision U-Th dating of fossil microatolls", *Coral Reefs* 35 (2016), 625–39.

- 1 L. Stephens et al., "Archaeological assessment reveals Earth's early transformation through land use", *Science* 365 (2019), 897–902.
- 2 X. Li et al., "Increases of population and expansion of rice agriculture in Asia, and anthropogenic methane emissions since 5000 BP", *Quaternary International* 202 (2008), 41–50; A. Timson et al., "Reconstructing regional population fluctuations in the European Neolithic using radiocarbon dates: a new case-study using an improved method", *Journal of Archaeological Science* 52 (2014), 549–57.
- 3 W. Ruddiman, "Geographic Evidence of the Early Anthropogenic Hypothesis", *Anthropocene* 20 (2017), 4–14.
- 4 W. Ruddiman, "The anthropogenic greenhouse era began thousands of years ago", *Climatic Change* 61 (2003), 261–93; P. Verburg et al., "Upscaling Regional Emissions of Greenhouse Gases from Rice Cultivation: Methods and Sources of Uncertainty", *Plant Ecology* 182 (2006), 89–106.
- 5 W. Ruddiman et al., "The early anthropogenic hypothesis: A review", *Quaternary Science Reviews* 240 (2020), 1–14.
- 6 S. Varvus et al., "Glacial Inception in Marine Isotope Stage 19: An Orbital Analog for a Natural Holocene Climate", *Scientific Reports* 8 (2018), 1–12.
- 7 J. Chapman, B. Gaydarska ja M. Nebbia, "The Origins of Trypillia Megasites", *Frontiers in Digital Humanities* 6 (2019), 1–20.
- 8 A. Shukurov et al., "Productivity of Premodern Agriculture in the Cucuteni-Trypillia Area", *Human Biology* 87 (2015), 235–82.
- 9 R. Hofmann et al., "Governing Tripolye: Integrative architecture in Tripolye settlements", *Plos ONE* 14 (2019), 1–54.
- 10 T. Harper, "Demography and climate in Late Eneolithic Ukraine, Moldova and Romania: Multiproxy evidence and pollen-based regional corroboration", *Journal of Archaeological Science: Reports* 23 (2019), 973–82.
- 11 R. Ohlrau et al., "Living on the Edge? Carrying Capacities of Trypillian Settlements in the Buh–Dnipro Interfluve", teoksessa J. Müller, K. Rassamann ja M. Videlko (toim.), *Trypillia Mega-Sites and European Prehistory, 4100–3400 BCE* (Lontoo, 2016), 207–20.
- 12 J. Chapman ja B. Gaydarska, "Low-density urbanism: the case of the Trypillia group of Ukraine", teoksessa M. Fernández-Götz ja D. Krausse (toim.), *Eurasia at the Dawn of History: Urbanisation and Social Change* (Cambridge, 2016), 81–105.

- 13 N. Rascovan et al., "Emergence and Spread of Basal Lineages of *Yersinia pestis* during the Neolithic Decline", *Cell* 176 (2019), 295–305.
- 14 S. Kadrow, "The concept of the 'stage of reduction and concentration of settlements' in Neolithic studies: demography, settlements and social conflict", *Documenta Praehistorica* 47 (2020), 232–44.
- 15 R. Wuthnow, *Meaning and Moral Order: Explorations in Cultural Analysis* (Berkeley, 1987); S. Kadrow, "The concept of the 'stage of reduction and concentration of settlements' in Neolithic studies: demography, settlements and social conflict", *Documenta Praehistorica* 47 (2020), 232–44.
- 16 P. Bellwood, "Holocene Population History in the Pacific Region as a Model for Worldwide Food Producer Dispersals", *Current Anthropology* 52 (2011), 363–78.
- 17 M. Sanger ja Q.-M. Ogden, "Determining the use of Late Archaic shell rings using lithic data: 'ceremonial villages' and the importance of stone", *Southeastern Archaeology* 37 (2018), 232–52.
- 18 M. Sanger, "Coils, slabs, and molds: examining community affiliation between Late Archaic shell ring communities using radiographic imagery of pottery", *Southeastern Archaeology* 36 (2017), 95–109.
- 19 D. Davis et al., "Deep learning reveals extent of Archaic Native American shell-ring building practices", *Journal of Archaeological Science* 132 (2021), 1–12.
- 20 M. Robbeets et al., "Triangulation supports agricultural spread of the Transeurasian languages", *Nature* (2021), 1–20.
- 21 W. Haak et al., "Massive migration from the steppe was a source for Indo-European languages in Europe", *Nature* 522 (2015), 207–11.
- 22 F. Clemente, "The genomic history of the Aegean palatial civilizations", *Cell* 184 (2021), 2565–86.
- 23 A. Juras et al., "Mitochondrial genomes reveal an east to west cline of steppe ancestry in Corded Ware populations", *Scientific Reports* 8 (2018), 1–10.
- 24 I. Olalde et al., "The Beaker phenomenon and the genomic transformation of northwest Europe", *Nature* 555 (2018), 190–6.
- 25 L. Papac et al., "Dynamic changes in genomic and social structures in third millennium BCE central Europe", *Science Advances* 7 (2021), 1–18.
- 26 M. Pearson, "Beaker people in Britain: migration, mobility and diet", *Antiquity* 90 (2016), 620–37.
- 27 N. Yoffee, *Myths of the Archaic State: Evolution of the Earliest Cities, States and Civilisations* (Cambridge, 2004), 62, 214.
- 28 Ks. R. Carneiro, "A theory of the origin of the state", *Science* 169 (1970), 733–8; Brooke, *Climate Change*, 189.

- 29 P. Akkermans ja G. Schwartz, *The Archaeology of Syria: From Complex Hunter-Gatherers to Early Urban Societies (ca. 16,000–300 BC)* (Cambridge, 2003), 154ff.; D. Wengrow, "The evolution of simplicity: aesthetic labour and social change in the Neolithic Near East World", *Archaeology* 33 (2001), 168–88; J. Clarke et al., "Climatic changes and social transformations in the Near East and North Africa during the 'long' 4th millennium BC: A comparative study of environmental and archaeological evidence", *Quaternary Science Reviews* 136 (2016), 104.
- 30 A. Sherratt, "Cash Crops before Cash: Organic Consumables and Trade", teoksessa C. Godson ja J. Hather (toim.), *The Prehistory of Food: Appetites for Change* (Lontoo, 1999), 13–34.
- 31 A. Stevenson, "The Egyptian Predynastic and State Formation", *Journal of Archaeological Research* 24 (2016), 421–68; V. Tripathi, "Metals and Metallurgy in the Harappan Civilization", *Indian Journal of History of Science* 53 (2018), 279–95; L. Liu ja X. Chen, *The Archaeology of China: From the Late Paleolithic to the Early Bronze Age* (Cambridge, 2012), 169–252.
- 32 T. Kohler, "Greater post-Neolithic wealth disparities in Eurasia than in North America and Mesoamerica", *Nature* 551 (2017), 619–22.
- 33 M. Borgerhoff Mulder et al., "Pastoralism and Wealth Inequality", *Current Anthropology* 51 (2010), 35–48.
- 34 E. Smith et al., "Wealth Transmission and Inequality among Hunter-Gatherers", *Current Anthropology* 51 (2010), 19–34.
- 35 Terminologiasta ks. M. Frangipane, "Different Trajectories in State Formation in Greater Mesopotamia: A View from Arslantepe (Turkey)", *Journal of Archaeological Research* 26 (2018), 3–63.
- 36 J. Ur, "Cycles of Civilization in Northern Mesopotamia", *Journal of Archaeological Research* 18 (2010), 390–3.
- 37 J. Ur, P. Karsgaard ja J. Oates, "Urban development in the ancient Near East", *Science* 317 (2007), 1188.
- 38 M. Liverani, *Uruk: The First City* (Lontoo, 2006).
- 39 D. Katz, "Ups and Downs in the Career of Enmerkar, King of Uruk", teoksessa O. Drewnowska ja M. Sandowicz (toim.), *Fortune and Misfortune in the Ancient Near East* (Winona Lake, IN, 2017), 201–10.
- 40 M. Civil, "Remarks on D-GI (AKA 'Archaic World List C' or 'Tribute')", *Journal of Cuneiform Studies* 65 (2013), 20.
- 41 M. Hudson, "The dynamics of privatization, from the Bronze Age to the present", teoksessa M. Hudson ja B. Levine (toim.), *Privatization in the Ancient Near East and Classical World* (Cambridge, MA, 1996), 37.
- 42 G. Algaze, *Ancient Mesopotamia at the Dawn of Civilisation* (Chicago, 2008), 190.

- 43 C. Lamberg-Karlovsky, *Beyond the Tigris and Euphrates: Bronze Age Civilisations* (Beer-Sheva, 1996), 82ff.
- 44 J. Manning, "Egypt", teoksessa P. Bang ja W. Scheidel (toim.), *The Oxford Handbook of the State in the Ancient Near East and Mediterranean* (Oxford, 2013), 61–93.
- 45 B. Pennington, "Landscape change in the Nile Delta during the fourth millennium BC: A new perspective on the Egyptian Predynastic and Protodynastic periods", *World Archaeology* 52 (2021), 550–65.
- 46 C. Renfrew ja L. Bin, "The emergence of complex society in China: the case of Liangzhu", *Antiquity* 92 (2018), 975–90.
- 47 E. Childs-Johnson, "The Art of Working Jade and the Rise of Civilization in China", teoksessa E. Childs-Johnson ja F. Gu, *The Jade Age and Early Chinese Jade in American Museums* (Beijing, 2009), 291–393.
- 48 P. Michalowski, "The Domestication of Stranger Kings: Making History by List in Ancient Mesopotamia", teoksessa J. Bains, H. van der Blom, T. Rood ja W. Chen (toim.), *Historical Consciousness and the Use of the Past in the Ancient World* (Sheffield, 2019), 15–38; Y. Pines, "Chu identity as seen from its manuscripts: a re-evaluation", *Journal of Chinese History* 2 (2017), 1–26.
- 49 Ks. esim. D. Johnson, "God's punishment and public goods: a test of the supernatural punishment hypothesis in 186 world cultures", *Human Nature* 16 (2005), 410–46; ks. myös D. Johnson, "The wrath of academics: criticisms, applications, and extensions of the supernatural punishment hypothesis", *Religion, Brain Behaviour* 8 (2018), 320–50.
- 50 H. Whitehouse et al., "Complex societies precede moralizing gods throughout world history", *Nature* 568 (2019), 226–9.
- 51 D. Keightley, "What did make the Chinese 'Chinese?'", teoksessa D. Keightley, *These Bones Shall Rise Again: Selected Writings on Early China* (Albany, NY, 2014), 78–9.
- 52 J. Watts et al., "Ritual human sacrifice promoted and sustained the evolution of stratified societies", *Nature* 532 (2016), 228–31.
- 53 D. Katz, "Sumerian funerary rituals in context", teoksessa N. Laneri, *Performing Death: Social Analyses of Funerary Traditions in the Ancient Near East and Mediterranean* (Chicago, 2007), 169–70.
- 54 S. Pollock, "Feast, funerals and fast food in early Mesopotamian states", teoksessa T. Bray (toim.), *The Archaeology and Politics of Food and Feasting in Early States and Empires* (New York, 2003), 17–38.
- 55 A. Baadsgaard et al., "Human sacrifice and intentional corpse preservation in the Royal Cemetery of Ur", *Antiquity* 85 (2011), 27–42.

- 56 J. Ur, "Households and the Emergence of Cities in Ancient Mesopotamia", *Cambridge Archaeological Journal* 26 (2014), 249–68; H. Nissen, *The Early History of the Ancient Near East* (Chicago, 1988), 83–5.
- 57 R. Redding, "A Tale of Two Sites: Old Kingdom Subsistence Economy and the Infrastructure of Pyramid Construction", teoksessa B. De Cupere, V. Linseele ja S. Hamilton-Dyer (toim.), *Archaeology of the Near East X: Proceedings of the 10th Meeting of the ICAZ Working Group "Archaeozoology of Southwest Asia and Adjacent Areas"* (Leuven, 2014), 307–22.
- 58 I. Diakonoff, "The Rise of the Despotic State in Ancient Mesopotamia", teoksessa I. Diakonoff (toim.), *Ancient Mesopotamia: Socio-economic History* (Moskova, 1969), 173–203.
- 59 R. Ellison, "Diet in Mesopotamia: The Evidence of the Barley Ration Texts (c.3000–1400 BC)", *Iraq* 43 (1981), 35–45.
- 60 B. Foster, "The Sargonic Period: Two Historiographical Problems", teoksessa G. Barjamovic et al., *Akkade is King: A Collection of Papers by Friends and Colleagues Presented to Aage Westenholz* (Leiden, 2011), 127–38.
- 61 S. Pollock, *Ancient Mesopotamia: The Eden That Never Was* (Cambridge, 1999), 123–48.
- 62 Ibid., 72–3.
- 63 O. Bar-Yosef, "The Walls of Jericho: An Alternative Interpretation", *Current Anthropology* 27 (1986), 157–62.
- 64 P. Butterlin ja Rey, "Mari and the Development of Complex Defensive Systems in Mesopotamia at the Dawn of History", teoksessa R. Frederiksen, S. Müth, P. Schneider ja M. Schnelle (toim.), *Focus on Fortifications: New Research on Fortifications in the Ancient Mediterranean and the Near East* (Oxford, 2016), 23–33.
- 65 A. Gnirs, "Ancient Egypt", teoksessa K. Raaflaub ja N. Rosenstein (toim.), *War and Society in the Ancient and Medieval Worlds: Asia, the Mediterranean, Europe and Mesoamerica* (Washington, DC, 1999), 71–104.
- 66 J. Scott, *Against the Grain: A Deep History of the Earliest States* (New Haven, 2017), 152–3; ks. myös N. Clark, "(Un)Earthing Civilization: Holocene Climate Crisis, City-State Origins and the Birth of Writing", *Humanities* 9 (2020), 1–16.
- 67 Algaze, "Demographic Trends in Early Mesopotamian Urbanism", teoksessa C. Maner, M. Horowitz ja A. Gilbert (toim.), *Overturning Certainties in Near Eastern Archaeology* (Leiden, 2017), 25–33.
- 68 Ibid., 29.

- 69 Algaze, *Ancient Mesopotamia*, 81.
- 70 P. Beaujard, *The Worlds of the Indian Ocean: A Global History* (Cambridge, 2019), 56.
- 71 J.-J. Glassner, *La Mésopotamie* (Pariisi, 2002), 13–19, 220–4.
- 72 D. Schmandt-Besserat, "The Token System of the Ancient Near East: Its Role in Counting, Writing, the Economy and Cognition", teoksessa I. Morley ja C. Renfrew (toim.), *The Archaeology of Measurement Comprehending Heaven, Earth and Time in Ancient Societies* (Cambridge, 2010), 27–34.
- 73 D. Schmandt-Besserat, "The Evolution of Writing", teoksessa J. Wright (toim.), *International Encyclopedia of Social and Behavioural Sciences* (Amsterdam, 2014).
- 74 Ks. kuitenkin B. Ansumali Mukhopadhyay, "Interrogating Indus inscriptions to unravel their mechanisms of meaning conveyance", *Humanities and Social Sciences Communications* 5 (2019), 1–37.
- 75 M. Oelschlaeger, *The Idea of Wilderness: From Prehistory to the Age of Ecology* (New Haven, 1991), 36–8.
- 76 Ks. esim. A. Gardiner, *Ancient Egyptian Onomastica* (Lontoo, 1947); R. Hallock ja B. Landsberger, *Materialien zum Sumerischen Lexikon* (Rome, 1956).
- 77 Keightley, "What did make the Chinese 'Chinese'?" 80.
- 78 J. Clayton, A. De Trafford ja M. Borda, "A Hieroglyphic Inscription Found at Jebel Uweinat Mentioning Yam and Tekhebet", *Sahara* 19 (2008), 129–35; Bruce Beyer-Williams, "Kush in the Wider World during the Kerma Period", teoksessa G. Emberling ja B. Beyer-Williams (toim.), *The Oxford Handbook of Ancient Nubia* (Oxford, 2021), 179–200.
- 79 G. Possehl, "Sociocultural complexity without the state: the Indus civilization", teoksessa G. Feinman ja J. Marcus (toim.), *Archaic States* (Santa Fe, NM, 1998), 261–91.
- 80 A. Green, "Killing the Priest-King: Addressing Egalitarianism in the Indus Civilization", *Journal of Archaeological Research* (2020), 1–50.
- 81 T. Pozorski ja S. Pozorski, "Early complex society on the north and central Peruvian coast: new archaeological discoveries and new insights", *Journal of Archaeological Research* 26 (2018), 353–86.
- 82 M. Moseley, "Maritime foundations and multilinear evolution: Retrospect and prospect", *Andean Past* 3 (1992), 5–42; J. Haas ja W. Creamer, "Crucible of Andean Civilization: The Peruvian Coast from 3000 to 1800 BC", *Current Anthropology* 47 (2006), 745–75.

- 83 R. Shady, "Los orígenes de la civilización y la formación del estado en el Perú: Las evidencias arqueológicas de Caral-Supe", teoksessa R. Shady ja C. Leyva (toim.), *La ciudad sagrado de Caral-Supe. Los orígenes de la civilización andina y la formación del estado prístino en el antiguo Perú* (Lima, 2003), 93–100.
- 84 Pozorski ja Pozorski, "Early complex society", 375–6.
- 85 J. Haas et al., "Evidence for maize (*Zea mays*) in the Late Archaic (3000–1800 BC) in the Norte Chico region of Peru", *PNAS* 110 (2013), 4945–9.
- 86 Brooke, *Climate Change*, 183–4; J. Richardson ja D. Sandweiss, "Climate Change, El Niño and the Rise of Complex Society on the Peruvian Coast during the Middle Holocene", teoksessa D. Sandweiss ja J. Quilter (toim.), *El Niño, Catastrophism and Culture Changes in Ancient America* (Washington, DC, 2008), 59–75.
- 87 J. Haas ja W. Creamer, "Why do people build monuments? Late Archaic platform mounds in the Norte Chico", teoksessa R. Burger ja R. Rosenweig (toim.), *Early New World Monumentality* (Gainesville, FL, 2012), 289–312; R. Burger ja L. Salazar, "Monumental public complexes and agricultural expansion on Peru's central coasts during the second millennium bc", teoksessa Burger ja Rosenweig (toim.), *Early New World Monumentality*, 399–430.
- 88 Haas ja Creamer, "Crucible of Andean Civilization", 751.
- 89 R. Burger ja K. Makowski, *Arqueología del Período Formativo en la Cuenca Baja de Lurín* (Lima, 2009).
- 90 B. Gaydarska, M. Nebbia ja J. Chapman, "Trypillia Megaliths in Context: Independent Urban Development in Chalcolithic Eastern Europe", *Cambridge Archaeological Journal* 30 (2020), 97–121.
- 91 J. Cooper, *Reconstructing History from Ancient Inscriptions: The Lagash–Umma Border Conflict* (Malibu, CA, 1983).
- 92 E. Stone, "Mesopotamian cities and countryside", teoksessa D. Snell (toim.), *A Companion to the Ancient Near East* (Malden, MA, 2005), 141–54.
- 93 S. Dalley, "The Natural World in Ancient Mesopotamian Literature", teoksessa Parham ja Westling (toim.), *A Global History of Literature and the Environment*, 25–6.
- 94 Ks. esim. A. Frank ja W. Thompson, "Afro-Eurasian Bronze Age Economic Expansion and Contraction Revisited", *Journal of World History* 16 (2005), 115–72.
- 95 A. Podany, *Brotherhood of Kings: How International Relations Shaped the Ancient Near East* (Oxford, 2010).

- 96 M. Van De Mieroop, "In Search of Prestige: Foreign contacts and the rise of an elite in early Dynastic Babylonia", teoksessa E. Ehrenberg (toim.), *Leaving No Stones Unturned: Essays on the Ancient Near East and Egypt in Honour of Donald P. Hansen* (Winona Lake, IN, 2002), 125–38; L. Liu, "'The products of minds as well as of hands': production of prestige goods in the Neolithic and Early States Periods of China", *Asian Perspectives* 42 (2003), 1–40.
- 97 W. Thompson, "Climate, Water and Political-Economic Crises in Ancient Mesopotamia and Egypt", teoksessa A. Hornborg ja C. Crumley (toim.), *The World System and the Earth System: Global Socioenvironmental Change and Sustainability since the Neolithic* (Walnut Creek, CA, 2006), 165–6.
- 98 G. Algaze, "Initial Social Complexity in Southwestern Asia: The Mesopotamian Advantage", *Current Anthropology* 42 (2001), 199–233.
- 99 Lander, *The King's Harvest*, 25–8.
- 100 *Enki and the World Order*, teoksessa J. Black et al. (toim.), *The Literature of Ancient Sumer* (Oxford, 2004), 220–1.
- 101 *Myths from Mesopotamia: Creation, the Flood, Gilgamesh, and Others*, kään. S. Dalley (Oxford, 2008), 257.
- 102 Ibid., 269–70.
- 103 *The Rig Veda*, kään. W. Doniger (Lontoo, 2005), 1:32, 150–6.
- 104 Ensimmäinen Mooseksen kirja, 1:1–2, 1:26.
- 105 Ensimmäinen Mooseksen kirja, 1:28–30, 3:17–19.

YLI VAROJEN ELÄMISEN VAARAT

- 1 M. Van De Mieroop, *The Ancient Mesopotamian City* (Oxford, 1997), 68–78.
- 2 D. Frayne, *The Royal Inscriptions of Mesopotamia: Sargonic and Gutian Periods*, 2 vols (Toronto, 1993), 2, 23.
- 3 A. Grayson, *Assyrian and Babylonian Chronicles* (Locust Valley, NY, 1966), 1–3.
- 4 J.-J. Glassner, *Mesopotamian Chronicles* (Atlanta, 2004), x.
- 5 A. Westenholz, "The Old Akkadian Period: History and Culture", teoksessa P. Attinger ja M. Wäfler (toim.), *Mesopotamien: Akkade-Zeit und Ur III-Zeit* (Göttingen, 1999), 17.
- 6 J. Westenholz, *Legends of the Kings of Akkade: The Texts* (Winona Lake, IN, 1997), 221–62, 300–31.
- 7 Black et al. (toim.), *Literature of Ancient Sumer*, "The Cursing of Agade", 122.

- 8 H. Arz, J. Kaiser ja D. Fleitmann, "Paleoceanographic and paleoclimatic changes around 2200 BC in sediment cores from the northern Red Sea", teoksessa H. Meller et al. (toim.), *2200 BC: A Climatic Breakdown as a Cause for the Collapse of the Old World?* (Halle, 2015), 53–61.
- 9 T. Watanabe, "Oman corals suggest that a stronger winter shamal season caused the Akkadian Empire (Mesopotamia) collapse", *Geology* 47 (2019), 1141–5.
- 10 S. Carolin et al., "Precise timing of abrupt increase in dust activity in the Middle East coincident with 4.2ka social change", *PNAS* 116 (2019), 67–72.
- 11 H. Weiss et al., "The Genesis and Collapse of Third Millennium North Mesopotamian Civilization", *Science* 261 (1993), 995–1004.
- 12 H. Weiss, "4.2 ka BP Megadrought and the Akkadian Collapse", teoksessa H. Weiss (toim.), *Megadrought and Collapse: From Early Agriculture to Angkor* (Oxford, 2017), 93–160.
- 13 Brooke, *Climate Change*, 292–3. Gutilaisista ks. "Cursing of Agade", teoksessa Black et al. (toim.), *Literature of Ancient Sumer*, 119.
- 14 Ks. C. Kuzucuoğlu ja C. Marro, *Sociétés humaines et changement climatique à la fin du troisième millénaire: une crise a-t-elle eu lieu en Haute Mésopotamie?: Actes du Colloque de Lyon, 5–8 Décembre 2005* (Lyon, 2007).
- 15 M. Walker et al., "Formal subdivision of the Holocene Series/Epoch: A Discussion Paper by a Working Group of INTIMATE (Integration of ice-core marine and terrestrial records) and the Subcommission on Quaternary Stratigraphy (International Commission on Stratigraphy)", *Journal of Quaternary Science* 27 (2012), 649–59.
- 16 The International Commission on Stratigraphy, "Collapse of civilizations worldwide defines youngest unit of the Geologic Time Scale", www.stratigraphy.org. Ks. myös M. Walker et al., "Formal Subdivision of the Holocene Series/Epoch: A Summary", *Journal of the Geological Society of India* 93 (2019), 135–41.
- 17 Hyvänä yleiskatsauksena ks. M. Ran ja L. Chen, "The 4.2 ka BP climatic event and its cultural responses", *Quaternary International* 521 (2019), 158–67.
- 18 R. Bradley ja J. Bakke, "Is there evidence for a 4.2 ka BP event in the northern Atlantic region?", *Climate of the Past* 15 (2019), 1665–76.
- 19 M. Griffiths et al., "End of Green Sahara amplified mid- to late Holocene megadroughts in mainland Southeast Asia", *Nature Communications* 11 (2020), 1–12.

- 20 Ks. dokumenttikokoelma teoksessa D. Rousseau et al., "Special issue – the 4.2ka climatic event", *Climate of the Past* 15 (2019).
- 21 G. Middleton, "Bang or whimper", *Science* 361 (2018), 1204–5.
- 22 V. Villalba-Mouco, "Genomic transformation and social organization during the Copper Age–Bronze Age transition in southern Iberia", *Science Advances* 7 (2021), 1–18.
- 23 Y. Dixit, D. Hodell ja C. Petrie, "Abrupt weakening of the summer monsoon in northwest India", *Geology* 42 (2014), 339–42; S. Prasad ja Y. Enzel, "Holocene paleoclimates of India", *Quaternary Research* 66 (2006), 442–53.
- 24 A. Singh et al., "Counter-intuitive influence of Himalayan river morphodynamics on Indus Civilisation urban settlements", *Nature Communications* 8 (2017), 1–14.
- 25 L. Giosan et al., "Fluvial landscapes of the Harappan civilization", *PNAS* 109 (2012), 1688–94.
- 26 L. Giosan et al., "Neoglacial climate anomalies and the Harappan metamorphosis", *Climate of the Past* 14 (2018), 1669–86.
- 27 G. Robbins Schug et al., "Infection, Disease and Biosocial Processes at the End of the Indus Civilization", *Plos ONE* 8 (2013), 1–20.
- 28 N. Scroxton et al., "Circum-Indian ocean hydroclimate at the mid-to late Holocene transition: The Double Drought hypothesis and consequences for the Harappan", *Climate of the Past* (2020).
- 29 T. Sengupta et al., "Did the Harappan settlement of Dholavira (India) collapse during the onset of the Meghalayan stage drought?", *Journal of Quaternary Science* 35 (2020), 382–95.
- 30 Robbins Schug et al., "Infection, Disease and Biosocial Processes", 9–11.
- 31 H. Zhang et al., "Hydroclimatic variations in southeastern China during the 4.2 ka event reflected by stalagmite records", *Climate of the Past* 14 (2018), 1805–17.
- 32 H. Zhang, "Collapse of the Liangzhu and other Neolithic cultures in the lower Yangtze region in response to climate change", *Science Advances* 7 (2021), 1–9.
- 33 Q. Qu et al., "Outburst flood at 1920 BCE supports historicity of China's Great Flood and the Xia dynasty", *Science* 353 (2016), 579–82.
- 34 L. Tan et al., "Great flood in the middle-lower Yellow River reaches at 4000 a BP inferred from accurately-dated stalagmite records", *Science Bulletin* 63 (2018), 206–8; Q. Sun et al., "Climate as a factor for Neolithic cultural collapses approximately 4000 years BP in China", *Earth Science Reviews* 197 (2019), 1–21.

- 35 H. Xu, "Introduction to the Xia period: Definitions, Themes and Debate", teoksessa E. Childs-Johnson, *The Oxford Handbook of Early China* (Oxford, 2020), 161–75.
- 36 Ran ja Chen, "Climatic event", 164–5.
- 37 Carolin et al., "Precise timing of abrupt increase in dust activity", 67–72.
- 38 Ks. esim. C. Renfrew, "Systems Collapse as Social Transformation: Catastrophe and Anastrophe in Early State Societies", teoksessa C. Renfrew ja K. Cooke (toim.), *Transformations: Mathematical Approaches to Culture Change* (New York, 1979), 481–506.
- 39 A. Otto, "Archaeological perspectives of the localization of Naram-Sin's Armanum", *Journal of Cuneiform Studies* 58 (2006), 1–25.
- 40 P. Michalowski, "The Kingdom of Akkad in Contact with the World", teoksessa K. Radner, N. Moeller ja D. Potts (toim.), *The Oxford History of the Ancient Near East*, vol. 1: *From the Beginnings of the Old Kingdom Egypt and the Dynasty of Akkad* (Oxford, 2020), 725.
- 41 G. Barjamovic, "Mesopotamian Empires", teoksessa Bang ja Scheidel (toim.), *Oxford Handbook of the State in the Ancient Near East*, 129–32.
- 42 G. Leick, *Mesopotamia: The Invention of the City* (Lontoo, 2003), 106–7.
- 43 I. Schrakamp, "The Kingdom of Akkad: A View from Within", teoksessa Radner, Moeller ja Potts (toim.), *Oxford History of the Ancient Near East*, 627–32.
- 44 L. Oppenheim, *Ancient Near Eastern Texts Relating to the Old Testament* (Princeton, 1969), 266.
- 45 S. Dalley, "The Epic of Atrahasis", teoksessa *Myths from Mesopotamia: Creation, the Flood, Gilgamesh, and Others*, käänt. S. Dalley (Lontoo, 2009), 7–31.
- 46 Ensimmäinen Mooseksen kirja, 6–8.
- 47 Ensimmäinen Mooseksen kirja, 18.6–19.27.
- 48 T. Buch et al., "A Tunguska sized airburst destroyed Tall el-Hammam a Middle Bronze Age city in the Jordan Valley near the Dead Sea", *Scientific Reports* 11 (2021), 1–63.
- 49 K. El-Rouayheb, *Before Homosexuality in the Arab-Islamic World, 1500–1800* (Chicago, 2005), 124–5.
- 50 "Cursing of Agade", teoksessa Black et al. (toim.), *Literature of Ancient Sumer*, 119.
- 51 J. Assmann, *The Mind of Egypt: History and Meaning in the Time of the Pharaohs* (Cambridge, MA, 2002), 109–13.
- 52 R. Faulkner, "The Admonitions of an Egyptian Sage", *Journal of Egyptian Archaeology* 51 (1965), 56.

- 53 F. Welc ja L. Marks, "Climate change and the end of the Old Kingdom in Egypt around 4200 BP: New geoarchaeological evidence", *Quaternary international* 324 (2014), 124–33.
- 54 Ibid.; K. Butzer, "Collapse, environment, and society", *PNAS* 109 (2012), 3632–9.
- 55 Faulkner, "Admonitions", 53–62.
- 56 N. Strudwick, "The Old Kingdom and First Intermediate Period", teoksessa I. Shaw ja E. Bloxam, *Oxford Handbook of Egyptology* (Oxford, 2020), 619–37.
- 57 X. Zhou et al., "5,200 year old cereal grains from the eastern Altai mountains redate the trans-Eurasian crop exchange", *Nature Plants* 6 (2020), 78–87; N. Boivin ja D. Fuller, "Shell middens, ships and seeds: exploring coastal subsistence, maritime trade and the dispersal of domesticates in and around the ancient Arabian Peninsula", *Journal of World Prehistory* 22 (2009), 113–80; R. Gutaker et al., "Genomic history and ecology of the geographic spread of rice", *Nature Plants* 6 (2020), 492–502.
- 58 D. Fuller ja N. Boivin, "Crops, cattle and commensals across the Indian Ocean: current and potential archaeobiological evidence", *Études Océan Indien* 42 (2009), 13–46; A. Scott et al., "Exotic foods reveal contact between South Asia and the Near East during the second millennium BCE", *PNAS* 118 (2021), 1–10.
- 59 I. Pugach et al., "Genome-wide data substantiates Holocene gene flow from India to Australia", *PNAS* 110 (2013), 1803–8.
- 60 H. Vandkilde, "Bronzization: The Bronze Age as Pre-Modern Globalization", *Praehistorische Zeitschrift* 9 (2016), 103–23.
- 61 R. Wright, *The Ancient Indus: Urbanism, Economy, and Society* (Cambridge, 2010), 221ff.
- 62 A. Sen, *Poverty and Famines: An Essay on Entitlement and Deprivation* (Oxford, 1981).

ENSIMMÄINEN YHTEYKSIEN AIKA

- 1 C. Woods, "Sons of the Sun: The Mythological Foundations of the First Dynasty of Uruk", *Journal of Ancient Near Eastern Religions* 12 (2012), 78–96.
- 2 *Law Collections from Mesopotamia and Asia Minor*, toim. M. Roth (Atlanta, GA, 1997), 20.
- 3 P. Barmash, *The Laws of Hammurabi: At the Confluence of Royal and Scribal Traditions* (Oxford, 2020), 138.

- 4 T. Bryce, "Anatolian States", teoksessa Bang ja Scheidel (toim.), *Oxford Handbook of the State in the Ancient Near East*, 161–79.
- 5 C. Broodbank, *An Island Archaeology of the Early Cyclades* (Cambridge, 2000), 341–9.
- 6 J. Bennet, "Bronze Age Greece", teoksessa Bang ja Scheidel (toim.), *Oxford Handbook of the State in the Ancient Near East*, 235–58.
- 7 Ibid.; C. Renfrew, *The Emergence of Civilisation: The Cyclades and the Aegean in the Third Millennium BC* (Lontoo, 1972), 225ff.; E. Tsafou ja J. García-Granero, "Beyond staple crops: exploring the use of 'invisible' plant ingredients in Minoan cuisine through starch grain analysis on ceramic vessels", *Archaeological and Anthropological Sciences* 13 (2021), 1–16.
- 8 Beyer-Williams, "Kush in the Wider World", 183–5.
- 9 A. Grayson, *Assyrian Royal Inscriptions* (Wiesbaden, 1972), 8.
- 10 A. Holl, "The dawn of African pastoralisms: An introductory note", *Journal of Anthropological Archaeology* 17 (1998), 81–96.
- 11 E. Coulibaly, *Savoir et savoir-faire des anciens métallurgistes d'Afrique* (Pariisi, 2006).
- 12 M. Brass, "The Emergence of Mobile Pastoral Elites during the Middle to Late Holocene in the Sahara", *Journal of African Archaeology* 17 (2019), 53–75.
- 13 V. Shinde, "An Ancient Harappan Genome Lacks Ancestry from Steppe Pastoralists or Iranian Farmers", *Cell* 179 (2019), 729–35.
- 14 M. Silva et al., "A genetic chronology for the Indian Subcontinent points to heavily sex-biased dispersals", *BMC Ecology and Evolution* 17 (2017), 1–18.
- 15 Ks. esim. Haak et al., "Massive migration from the steppe was a source for Indo-European languages in Europe", 207–11; W. Chang et al., "Ancestry-constrained phylogenetic analysis supports the Indo-European steppe hypothesis", *Language* 91 (2015), 194–244.
- 16 V. Narainhan et al., "The formation of human populations in South and Central Asia", *Science* 365 (2019), 1–16.
- 17 P. de Barros Damgaard, "The first horse herders and the impact of early Bronze Age steppe expansions into Asia", *Science* 360 (2018), 1–9. Ennen kaikkea ks. C. Renfrew, *Archaeology and Language: The Puzzle of Indo-European Origins* (Cambridge, 1987).
- 18 Useampien siirtolaisaltojen geneettisistä markkereista ks. G. Poznik et al., "Punctuated bursts in human male demography inferred from 1,244 worldwide Y-chromosome sequences", *Nature Genetics* 58 (2016), 593–9.

- 19 A. Basu et al., "Ethnic India: a genomic view, with special reference to peopling and structure", *Genome Research* 13 (2003), 2277–90.
- 20 Ks. A. Parpola, *The Roots of Hinduism: The Early Aryans and the Indus Civilization* (New York, 2015).
- 21 K. Plofker, "Humans, Demons, Gods and their Worlds: The Sacred and Scientific Cosmologies of India", teoksessa K. Raafala ja R. Talbert (toim.), *Geography and Ethnography: Perceptions of the World in Pre-Modern Studies* (Chichester 2010), 33; *Athara Veda*, 12.1.
- 22 F. Baird ja R. Helmbeck, *Philosophic Classics: Asian Philosophy* (Lontoo, 2005), 3.
- 23 J. Bourriau, "The Second Intermediate Period (c.1650–1550 BC)", teoksessa I. Shaw (toim.), *The Oxford History of Ancient Egypt* (Oxford, 2000), 188ff.
- 24 C. Stantis et al., "Who were the Hyksos? Challenging traditional narratives using strontium isotope ($^{87}\text{Sr}/^{86}\text{Sr}$) analysis of human remains from ancient Egypt", *Plos ONE* 15 (2020), 1–14; A.-L. Mourad, *Rise of the Hyskos: Egypt and the Levant from the Middle Kingdom to the Early Second Intermediate Period* (Oxford, 2015).
- 25 M. Bietak, "From where came the Hyskos and where did they go?", teoksessa M. Marée (toim.), *The Second Intermediate Period (Thirteenth–Seventeenth Dynasties)* (Leuven, 2010), 139–81.
- 26 T. Schneider, *Ausländer in Ägypten während des Mittleren Reiches und der Hyskoszeit* (Wiesbaden, 1998).
- 27 O. Goldwasser, "How the Alphabet was Born from Hieroglyphs", *Biblical Archaeology Review* 36 (2010), 40–53; F. Höflmayer, "Early alphabetic writing in the ancient Near East: the 'missing link' from Tel Lachish", *Antiquity* (2021), 1–15.
- 28 I. Shaw, "Egyptians, Hyskos and military technology: Causes, effects or catalysts?", teoksessa A. Shortland (toim.), *The Social Context of Technological Change: Egypt and the Near East, 1650–1550 BC* (Oxford, 2001), 59–71.
- 29 G. Beckman ja H. Hoffner, *Hittite Diplomatic Texts* (Atlanta, GA, 1996), 42–3; P. Thieme, "The 'Aryan' Gods of the Mitanni Texts", *Journal of the American Oriental Society* 80 (1960), 301–17.
- 30 D. Anthony, *The Horse, the Wheel and Language: How Bronze-Age Riders from the Eurasian Steppes Shaped the Modern World* (Princeton, 2007), 48–50.
- 31 de Barros Damgaard, "First horse herders", 1–9.

- 32 W. Kirlfel, *Das Purdna vom Weltgebduude* (Bonn, 1954); D. Pingree, "The Mesopotamian Origin of Early Indian Mathematical Astronomy", *Journal for the History of Astronomy* 4 (1973), 1–12.
- 33 R. Burger, *Chavín and the Origins of Andean Civilization* (Lontoo, 1992); R. Burger ja L. Salazar, "The Manchay culture and the coastal inspiration for highland Chavín civilization", teoksessa W. Conklin ja J. Quilter, *Chavín Art, Architecture and Culture* (Los Angeles, CA, 2008), 85–105.
- 34 P. Heggarty ja D. Beresford-Jones, "Agriculture and language dispersals: limitations, refinements, and an Andean exception", *Current Anthropology* 51 (2010), 163–91.
- 35 S. Pozorski ja T. Pozorski, "Early Cultural Complexity on the Coast of Peru", teoksessa H. Silverman ja W. Isbell (toim.), *The Handbook of South American Archaeology* (New York, 2008), 607–31.
- 36 J. Li et al., "When peripheries were centres: a preliminary study of the Shimao-centred polity in the loess highland, China", *Antiquity* 92 (2018), 1008–22.
- 37 R. Bagley, "Shang Archaeology", teoksessa M. Loewe ja E. Shaughnessy (toim.), *The Cambridge History of Ancient China from the Origins of Civilization to 221 bc* (Cambridge, 1999), 124–231.
- 38 R. Thorp, *Early Bronze Age China: Shang Civilization* (Philadelphia, 2006).
- 39 D. Keightley, "The Shang: China's first historical dynasty", teoksessa Loewe and Shaughnessy (toim.), *Cambridge History of Ancient China*, s. 232–91.
- 40 M. Vlok et al., "Forager and farmer evolutionary adaptations to malaria evidenced by 7000 years of thalassemia in Southeast Asia", *Scientific Reports* 11 (2021), 1–15; K. Klieman, *The Pygmies Were our Compass: Bantu and Batwa in the History of Western Central Africa: Early Times to c.1900 CE* (Portsmouth, NH, 2003).
- 41 J. Webb, "Malaria and the Peopling of Early Tropical Africa", *Journal of World History* 16 (2005), 269–91.
- 42 D. Dominey-Howes, "A re-analysis of the Late Bronze Age eruption and tsunami of Santorini, Greece, and the implications for the volcano–tsunami hazard", *Journal of Volcanology and Geothermal Research* 130 (2004), 107–32; P. Nomikou et al., "Post-eruptive flooding of Santorini caldera and implications for tsunami generation", *Nature Communications* 7 (2016), 1–10; NASA Jet Propulsion Laboratory, "Thera/Santorini Eruption", 1.12.1989.

- 43 I. Babkin ja I. Babkina, "The Origin of the Variola Virus", *Viruses* 7 (2015), 1100–12.
- 44 D. Henderson, "The eradication of smallpox – An overview of the past, present and future", *Vaccine* 29 (2011), 7–9; D. Henderson, *Smallpox: The Death of a Disease* (Amherst, NY, 2009).
- 45 E. Strouhal, "Traces of a smallpox epidemic in the family of Ramesses V of the Egyptian 20th dynasty", *Anthropologie* 34 (1996), 315–19.
- 46 R. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism* (Cambridge, 1995), 19.
- 47 S. Liu et al., "Did China import metals from Africa in the Bronze Age?", *Archaeometry* 60 (2018), 105–17; W.-d. Sun et al., "Origin of the mysterious Yin-Shang bronzes in China indicated by lead isotopes", *Scientific Reports* 6 (2016), 1–9.
- 48 I. Singer, "A political history of Ugarit", teoksessa W. Watson ja N. Wyatt (toim.), *Handbook of Ugaritic Studies* (Leiden, 1999), 603–733.
- 49 E. Cline, 1177 BC: *The Year Civilisation Collapsed* (Princeton, 2014), 154–5.
- 50 Ibid., 155.
- 51 Y. Cohen ja I. Singer, "Late synchronism between Ugarit and Emar", teoksessa Y. Amit et al. (toim.), *Essays on Ancient Israel in its Near Eastern Context: A Tribute to Nadav Na'aman* (Winona Lake, IN, 2006), 123–39.
- 52 W. Edgerton, "The Strikes in Ramses III's Twenty-Ninth Year", *Journal of Near Eastern Studies* 10 (1951), 137–45.
- 53 J. Janssen, *Commodity Prices from the Ramessid Period: An Economic Study of the Village of the Necropolis Workmen at Thebes* (Leiden, 1975).
- 54 M. Feldman et al., "Ancient DNA sheds light on the genetic origins of early Iron Age Philistines", *Science Advances* 5 (2019), 1–10.
- 55 Singer, "Political history of Ugarit", 3.
- 56 J. Pritchard, *Ancient Near Eastern Texts Related to the Old Testament* (Princeton, 1969).
- 57 J. Wilson, "The War against the Peoples of the Sea", teoksessa J. Pritchard (toim.), *Ancient Near Eastern Texts Relating to the Old Testament* (Princeton, 1969), 262–3.
- 58 B. Drake, "The influence of climatic change on the Late Bronze Age Collapse and the Greek Dark Ages", *Journal of Archaeological Science* 39 (2012), 1862–70; D. Kaniewski ja E. Van Campo, "3.2 ka BP Megadrought and the Late Bronze Age Collapse", teoksessa Weiss (toim.), *Megadrought and Collapse*, 161–82.
- 59 P. LaMoreaux, "Worldwide environmental impacts from the eruption of Thera", *Environmental Geology* 26 (1995), 172–81.

- 60 R. Drews, *The End of the Bronze Age* (Princeton, 1993).
- 61 T. Bryce, "The secession of Tarhuntassa", teoksessa D. Groddek ja M. Zorman (toim.), *Tabularia Hethaeorum. Hethitologische Beiträge Silvin Košak zum 65. Geburtstag* (Wiesbaden, 2007), 119–29.
- 62 E. Cline, 1177 bc, 167–80; A. Nur, "Poseidon's Horses: Plate Tectonics and Earthquake Storms in the Late Bronze Age Aegean and Eastern Mediterranean", *Journal of Archaeological Science* 27 (2000), 43–63.
- 63 Hauraudesta ks. N. Taleb, *Antifragile: Things that Gain from Disorder* (New York, 2012).
- 64 H. Lee, V. Padmanabhan ja S. Whang, "The Bullwhip Effect in Supply Chains", *MIT Sloan Management Review* 38 (1997), 93–102.
- 65 T. Kidder et al., "Multi-method geoarchaeological analyses demonstrates exceptionally rapid construction of Ridge West 3 at Poverty Point", *Southeastern Archaeology* 40 (2021), 1–16.
- 66 T. Kidder, E. Henry ja L. Arco, "Rapid climate change-induced collapse of hunter-gatherer societies in the lower Mississippi River valley between ca.3300 and 27880 cal yr BP", *Science China Earth Sciences* 61 (2018), 178–89.
- 67 T. Kidder, "Climate change and the archaic to woodland transition (3000–2500 BP) in the Mississippi River Basin", *American Antiquity* 71 (2006), 195–231.
- 68 N. Heller et al., *The Tchefuncte Culture and the Early Woodland Period in Coastal Louisiana: New Analysis of the Tchefuncte, Bayou Jasmine, Lafayette Mounds, and Little Woods Sites* (New Orleans, 2013).
- 69 Li Feng, *Early China: A Social and Cultural History* (Cambridge, 2014), 66–III.
- 70 S. Bedford ja M. Spriggs (toim.), *Debating Lapita: Distribution, Chronology, Society and Subsistence* (Canberra, 2019); M. Spriggs ja D. Reich, "An ancient DNA Pacific journey: a case study of collaboration between archaeologists and geneticists", *World Archaeology* 51 (2019), 620–39.
- 71 E. Cochrane, "The Evolution of Migration: the Case of Lapita in the Southwest Pacific", *Journal of Archaeological Method and Theory* 25 (2018), 520–58.

LUONTO JA KORKEAMMAT VOIMAT

- 1 Dalley, "Epic of Atrahasis", 9–14.
- 2 Ibid., 13–14.
- 3 Ibid., 9–35.
- 4 I. Finkel, *The Ark before Noah: Decoding the Story of the Flood* (Lontoo, 2014).

- 5 Dalley, "Epic of Atrahasis", 31–5.
- 6 N. Yoffee, "The collapse of ancient Mesopotamian states and civilization", teoksessa N. Yoffee ja G. Cowgill (toim.), *The Collapse of Ancient States and Civilizations* (Tucson, AZ, 1988), 44–68.
- 7 J. Tainter, "Problem Solving: Complexity, History, Sustainability", *Population and Environment: A Journal of Interdisciplinary Studies* 22 (2000), 3–41.
- 8 Grove, *Green Imperialism*, 18–19.
- 9 Oelschlaeger, *Idea of Wilderness*, 39.
- 10 Dalley, "The Natural World in Ancient Mesopotamian Literature", 21–36.
- 11 Brooke, *Climate Change*, 211–12.
- 12 F. Rochberg, "Observing and Describing the World through Divination and Astronomy", teoksessa Radner ja Robson (toim.), *Oxford Handbook of Cuneiform Culture*, 631.
- 13 J. Ur, "Physical and Cultural Landscapes of Assyria", teoksessa E. Frahm (toim.), *A Companion to Assyria* (Hoboken, NJ, 2017), 21–2.
- 14 J. Ur, "Sennacherib's Northern Assyrian Canals: New Insights from Satellite Imagery and Aerial Photography", *Iraq* 67 (2005), 317–45.
- 15 P. Ergenzinger et al., "The Reconstruction of Environment, Irrigation and Development of Settlement in the Habur in North-east Syria", teoksessa J. Bintliff, D. Davidson ja E. Grant (toim.), *Conceptual Issues in Environmental Archaeology* (Edinburgh, 1988), 108–28.
- 16 E. Frahm, *Einleitung in die Sanherrib-Inschriften* (Vienna, 1997), 151–4.
- 17 K. Kessler, "Royal Roads and Other Questions of the Neo-Assyrian Communication System", teoksessa S. Parpola ja R. Whiting (toim.), *Assyria 1995: Proceedings of the 10th Anniversary Symposium of the Neo-Assyrian Text Corpus Project* (Helsinki, 1997), 129–36; Ur, "Physical and Cultural Landscapes of Assyria", 26.
- 18 B. Oded, *Mass Deportations and Deportees in the Neo-Assyrian Empire* (Wiesbaden, 1979), 20.
- 19 S. Parpola (toim.), *State Archives of Assyria*, 19 vols (Helsinki, 1987–), 19, 17.
- 20 K. Radner, "How Did the Neo-Assyrian King Perceive his Land and its Resource?", teoksessa R. Jas (toim.), *Rainfall and Agriculture in Northern Mesopotamia* (Leiden, 2000), 233–46.
- 21 Toinen kuninkaiden kirja, 18; K. Radner, "Economy, Society and Daily Life in the Neo-Assyrian Period", teoksessa Frahm (toim.), *Companion to Assyria*, 211.

- 22 British Museum, *I Am Ashurbanipal: King of the World, King of Assyria* (Lontoo, 2018).
- 23 D. Wiseman, "A new stela of Aššur-nasir-pal II", *Iraq* 14 (1952), 31–2; J. Bottéro, *Everyday Life in Ancient Mesopotamia* (Edinburgh, 2001), 70.
- 24 A. Thomason, "Representations of the North Syrian Landscape in Neo-Assyrian Art", *Bulletin of the American Schools of Oriental Research* 323 (2001), 63–96.
- 25 S. Dalley, *The Mystery of the Hanging Garden of Babylon: An Elusive World Wonder Traced* (Oxford, 2013).
- 26 T. Wilkinson, *Archaeological Landscapes of the Near East* (Tucson, AZ, 2003), 11–14. For the decline of Assyrian, J. Postgate, "The Four 'Neo-Assyrian' Tablets from Šēh Ḥamad", *State Archives of Assyria Bulletin* 7 (1993), 109–24.
- 27 A. Sachs ja H. Hunger, *Astronomical Diaries and Related Texts from Babylon*, 3 vols (Vienna, 1988–96).
- 28 U. Koch, "Sheep and Sky: Systems of Divinatory Interpretation", *Oxford Handbook of Cuneiform Culture*, 448–69.
- 29 E. Leichty, *The Omen Series Šumma Izbu* (Locust Valley, NY, 1970), 202.
- 30 H. Hunger, *Astrological Reports to Assyrian Kings* (Helsinki, 1992), 82; Koch, "Sheep and Sky", 449.
- 31 D. Keightley, "Oracle-Bone Inscriptions of the Late Shang Dynasty", teoksessa W. T. de Bary (toim.), *Sources of East Asian Tradition*, 2 vols (New York, 2008), 1, 15.
- 32 K. Chang, "Shang Shamans", teoksessa W. Peterson (toim.), *The Power of Culture: Studies in Chinese Cultural History* (Hong Kong, 1994), 10–36.
- 33 F. Li, *Early China: A Social and Cultural History* (Cambridge, 2013), 102.
- 34 Keightley, "The Shang: China's First Historical Dynasty", 266–8, 281.
- 35 Ibid., 252.
- 36 Keightley, "Oracle-Bone Inscriptions", 19.
- 37 Ibid., 21.
- 38 Karlgren, *Book of Odes*, 276, 244.
- 39 E. Shaughnessy, "Western Zhou History", teoksessa Loewe ja Shaughnessy (toim.), *Cambridge History of Ancient China*, 310–11.
- 40 B. Watson, D. Nivison ja I. Bloom, "Classical Sources of Chinese Tradition", teoksessa de Bary (toim.), *Sources of East Asian Tradition*, 1, 28.
- 41 B. Karlgren, *The Book of Odes* (Stockholm 1950), 258, 225.
- 42 C. Hsu ja K. Linduff, *Western Chou Civilisation* (New Haven, 1988), 283–4.

- 43 Sima Qian, *Records of the Grand Historian*, käännt. B. Watson (New York, 1969), 230–1.
- 44 F. Rochberg, "Observing and Describing the World through Divination and Astronomy", teoksessa K. Radner ja E. Robson (toim.), *The Oxford Handbook of Cuneiform Culture* (Oxford, 2011), 629–30.
- 45 W. van Soldt, *Solar Omens of Enuma Anu Enlil: Tablets 23(24)–29(30)* (Leiden, 1995), 29.
- 46 S. Parpolo, *Letters from Assyrian and Babylonian Scholars* (Helsinki, 1993), Text 100: 1-1-11, 77.
- 47 J. Hughes, "Sustainable agriculture in Ancient Egypt", *Agricultural History* 66 (1992), 17.
- 48 Hesiodos, *Works and Days*, käännt. A. Stallings (Lontoo, 2018), 12–14. Suomentanut Paavo Castrén: *Työt ja päivät*, Tammi 2004.
- 49 L. von Falkenhausen, "The economic role of cities in Eastern Zhou China", *Archaeological Research in Asia* 14 (2018), 161–9.
- 50 I. Bloom, "Confucius and the *Analects*", teoksessa de Bary (toim.), *Sources of East Asian Tradition*, 1, 29–32, Confucius, *Analects*, 16.8.
- 51 Laozi, "The Ways", teoksessa F. Müller (toim.), *The Sacred Books of the East*, 50 vols (Oxford, 1879–1910), 39, 50.
- 52 W. de Bary ja I. Bloom (toim.), *Sources of Chinese Tradition*, 2 vols (1999), 1, 93.
- 53 Mozi, "Honoring the Worthy", teoksessa de Bary (toim.), *Sources of East Asian Tradition*, 1, 43.
- 54 M. Sivaramakrishnan, "Ecopoetics and the Literature of Ancient India", teoksessa Parham and Westling (toim.), *Global History of Literature and the Environment*, 68.
- 55 *Rig Veda*, 6.70. M. Witzel, "Early Indian history: linguistic and textual parameters", teoksessa G. Erdosy (toim.), *The Indo-Aryans of Ancient South Asia: Language, Material Culture and Ethnicity* (Berliini, 1995), 307–52.
- 56 *Atharva Veda*, 6.56, 4.17.
- 57 Ibid., 8.7.10, 8.2.25, 19.38.1.
- 58 *Yajur Veda*, 38.22, 6.33.
- 59 Ibid., 13.37, 13.49.
- 60 *Rig Veda*, 5.80.
- 61 P. Olivelle, *The Early Upanisads: Annotated Text and Translation* (New York, 1998). *Upaniṣadien* ajoituksesta ks. myös S. Radhakrishnan, *The Principal Upaniṣads* (New Delhi, 2004), 20–2.
- 62 *The Thirteen Principal Upanishads*, käännt. F. Müller, tark. S. Navlakha (Lontoo, 2000), *Maitrāyaṇīya Upaniṣad*, 132.

- 63 N. Sundaraswaran, "Environmental and ecological awareness in the Rāmāyana and the Mahābhārata", *Samskratakairali* 5 (2016–17), 105–16.
- 64 *Rig Veda*, 10.121.
- 65 G. Flood, *An Introduction to Hinduism* (Cambridge, 1996), 6.
- 66 H. Bechert, *Die Datierung des historischen Buddha*, 3 vols (Göttingen, 1991–7).
- 67 R. Gethin, *The Foundations of Buddhism* (Oxford, 1998), 59–84.
- 68 Ks. esim. J. Bronkhorst, *Greater Magadha: Studies in the Culture of Early India* (Leiden, 2007).
- 69 *The Sutta-Nipāta*, kään. H. Saddhatissa (Lontoo, 1994), verse 136.
- 70 *Dīgha Nikāya, Dialogues of the Buddha*, toim. ja kään. T. Rhys Davids ja E. Carpenter, 3 vols (1890–1911), 3, 180ff.
- 71 *Khuddakapāṭha*, 8.
- 72 L. Schmithausen, "The early Buddhist tradition and ecological ethics", *Journal of Buddhist Ethics* 4 (1997), 11.
- 73 A. Embree, S. Hay ja W. de Bary (toim.), *Sources of Indian Tradition*, 2 vols (New York, 1988), 1, 46.
- 74 *Ācārāṅga Sūtra*, 1.1
- 75 *Sūtrakṛtārīga*, 1.1–9.
- 76 *Uttarādhyayana Sūtra*, 19.67–74.
- 77 *Sūtrakṛtārīga*, 1.1–9.
- 78 R. Thapar, *Early India: From the Origins to AD 1300* (Berkeley, 2005), 29–32, 280–2.
- 79 M. Fisher, *An Environmental History of India: From the Earliest Times to the Twenty-First Century* (Cambridge, 2018), 60–1.
- 80 P. Sahni, *Environmental Ethics in Buddhism: A Virtues Approach* (Lontoo, 2008), 47–8.
- 81 *Dīgha Nikāya*, 1, 141.
- 82 M. McLish, *The History of the Arthaśāstra: Sovereignty and Sacred Law in Ancient India* (Cambridge, 2019), 1–2.
- 83 *Kaustiaki Upaniṣad*, 1.2.
- 84 M. Burley, *Rebirth and the Stream of Life* (Lontoo, 2016), 102.
- 85 Herodotos, *The Histories (Historiateos)*, 2.123, 144.
- 86 Iamblichus, *De vita Pythagorica*, toim. G. Clark (Liverpool, 1989), 14, 25.
- 87 Empedokles, *The Extant Fragments*, toim. M. Wright (Lontoo, 1995), 108, 139.
- 88 R. Stoneman, *The Greek Experience of India: From Alexander to the Indo-Greeks* (Princeton, 2019), 341–2.

- 89 J. Hughes, *Environmental Problems of the Greeks and Romans* (Baltimore, 2014), 53.
- 90 Platon, *Timaeus*, toim. R. Bury (Cambridge, MA, 2014), 54.
Suomentaneet Marja Itkonen-Kaila, A. M. Anttila ja Marianna Tyni: "Timaios", *Teokset*, 5. osa, Otava 1982.
- 91 Hughes, *Environmental Problems*, 53.
- 92 Aristoteles, *Politics*, toim. H. Rackham (Cambridge, MA, 2014), 1.3, 20–2, 36. Suomentanut A. M. Anttila: *Politiikka*, Gaudeamus 1991.
- 93 Platon, *Phaedrus*, toim. C. Emlyn-Jones (Cambridge, MA, 2022), 356.
Suomentaneet Marja Itkonen-Kaila, A. M. Anttila ja Marianna Tyni: "Faidros", *Teokset*, 3. osa, Otava 1999.
- 94 Ksenofon, *Oikonomikos*, toim. E. Marchant (Cambridge, MA, 1997), 5, 428. Suomentanut Ulla Tervahauta: *Talouden taito*, Gaudeamus 2009.
- 95 J. Hughes, "Theophrastus as Ecologist", teoksessa W. Fortenbaugh ja R. Sharples (toim.), *Theophrastean Studies: Fifteen Papers on Natural Science, Physics and Metaphysics, Ethics, Religion and Rhetoric* (New Brunswick, NJ, 1998), 67–75.
- 96 R. Foltz ja M. Saadi-nejad, "Is Zoroastrianism an Ecological Religion?", *Journal for the Study of Religion, Nature and Culture* 1 (2007), 414–17.
- 97 Herodotos, *Histories*, 1.138, 63 (*Historiateos*); Strabon, *Geography*, 15.3, toim. ja käänd. H. Jones, 2 vols (Cambridge, MA, 1930), 2, 178; Foltz ja Saadi-nejad, "Is Zoroastrianism an Ecological Religion?", 421.
- 98 M. Boyce, *Zoroastrianism: Its Antiquity and Constant Vigour* (Costa Mesa, CA, 1992).
- 99 J. Duchesne-Guillemin, *The Hymn of Zarathustra, Being a Translation of the Gathas Together with Introduction and Commentary*, käänd. M. Henning (Boston, MA, 1992), *Yasna*, 50, 29–33.
- 100 L. Mills. "The Pahlavi Texts of the Yasna Haptanghaiti (Y. XXXV–XLI (XLII)) for the First Time Critically Translated", *The Journal of the Royal Asiatic Society of Great Britain and Ireland* (1905), 37.1, 64.
- 101 Duchesne-Guillemin, *Yasna*, 29, 56–61.
- 102 Mills. "The Pahlavi Texts of the Yasna Haptanghaiti", 66–9.
- 103 A. Amanat, "Environment and Culture: An Introduction", *Iranian Studies* 49 (2016), 928–9.
- 104 E. Frahm, "Assyria in the Hebrew Bible", teoksessa E. Frahm (toim.), *A Companion to Assyria* (Hoboken, NJ, 2017), 556–69.
- 105 Jesaja, 45.1. Huom. kuitenkin ongelmat kronologiassa liittyen juutalaisten vapautumiseen vankeudesta ja Kyyroksen valtakauteen: D. Edelman, *The Origins of the Second Temple: Persian Imperial Policy and the Rebuilding of Jerusalem* (Lontoo, 2005).

- 106 E. Davis, *Scripture, Culture, and Agriculture: An Agrarian Reading of the Bible* (Cambridge, 2009).
- 107 S. Kramer, "The 'Babel of Tongues': A Sumerian Version", *Journal of the American Oriental Society* 88 (1968), 108–11.
- 108 E. Bloom ja K. Weingart, "The Joseph Story: Diaspora Novella or North-Israelite Narrative?", *Zeitschrift für die alttestamentliche Wissenschaft* 129 (2017), 501–21; I. Knohl, "Joseph and the Famine: The Story's Origins in Egyptian History", <https://www.thetorah.com/article/joseph-and-the-famine-the-storys-origins-in-egyptian-history>.
- 109 T. Levy, T. Schneider ja W. Propp (toim.), *Israel's Exodus in Transdisciplinary Perspective: Text, Archaeology, Culture and Geoscience* (New York, 2015).
- 110 S. Garfinkle, "Ancient Near Eastern City States", teoksessa Bang ja Scheidel (toim.), *Oxford Handbook of the State in the Ancient Near East*, 107.
- 111 Oelschlaeger, *Idea of Wilderness*, 47.
- 112 D. Green, "The Garden of Eden in the Hebrew Bible", teoksessa Parham ja Westling (toim.), *Global History of Literature and the Environment*, 55–6.
- 113 Psalm 23:1–4.
- 114 Oelschlaeger, *Idea of Wilderness*, 49.
- 115 Viides Mooseksen kirja, 11:8–12; Green, "The Garden of Eden in the Hebrew Bible", 56–7.
- 116 Toinen Mooseksen kirja, 24:15–16; Ensimmäinen Mooseksen kirja, 9:13.
- 117 Hesekiel, 29:9–15; T. Tvedt, *The Nile: History's Greatest River* (Lontoo, 2021), 22–3.
- 118 K. Jaspers, *Vom Ursprung und Ziel der Geschichte* (Munich, 1949).
- 119 B. Wittrock, "Social Theory and Global History: The Three Cultural Crystallizations", *Thesis Eleven* 65 (2001), 27–50; B. Schwartz, "The age of transcendence", *Daedalus* 104 (1975), 1–7.
- 120 S. Eisenstadt, "Introduction: The Axial Age Breakthroughs – Their Characteristics and Origins", teoksessa S. Eisenstadt (toim.), *The Origins and Diversity of Axial Age Civilizations* (Albany, NY, 1986), 29–39.
- 121 I. Provan, *Convenient Myths: The Axial Age, Dark Green Religion and the World That Never Was* (Waco, TX, 2013); D. Mullins et al., "Systematic Assessment of 'Axial Age' Proposals Using Global Comparative Historical Evidence", *American Sociological Review* 83 (2018), 596–626.
- 122 R. Bellah, *Religion in Human Evolution: From the Paleolithic to the Axial Age* (Cambridge, MA, 2011).

- 123 N. Baumard et al., "Increased Affluence Explains the Emergence of Ascetic Wisdoms and Moralizing Religions", *Current Biology* 25 (2015), 10–15.
- 124 B. Karlgren, "The Book of Documents", *Museum of Far Eastern Antiquities, Bulletin* 20 (Stockholm, 1950), 33.
- 125 Ibid., 29, 85–91; J. Li, *Chinese Civilisation in the Making, 1766–221 BC* (New York, 1996), 85–91.
- 126 M. Elvin, "Who Was Responsible for the Weather? Moral Meteorology in Late Imperial China", *Osiris* (1998), 213–27.
- 127 J. Snyder-Reinke, *Dry Spells: State Rainmaking and Local Government in Late Imperial China* (Cambridge, MA, 2009), 24ff.; A. Birrell, *Chinese Mythology: An Introduction* (Baltimore, 1993), 72–83.
- 128 M. Bloch, "The Ritual of the Royal Bath in Madagascar: The Dissolution of Death, Birth and Fertility into Authority", teoksessa D. Cannadine ja S. Price (toim.), *Rituals of Royalty: Power and Ceremonial in Traditional Societies* (Cambridge, 1987), 271–97; C. Geertz, *Negara: The Theatre State in Nineteenth-Century Bali* (Princeton, 1980).
- 129 T. Lewis, "A History of Buddhist Ritual", teoksessa J. Powers (toim.), *The Buddhist World* (Lontoo, 2015), 325.
- 130 B. Ruppert, "Buddhist Rainmaking in Early Japan: The Dragon King and the Ritual Careers of Esoteric Monks", *History of Religions* 42 (2002), 143–74.
- 131 V. Scarborough, "Ecology and Ritual: Water Management and the Maya", *Latin American Antiquity* 9 (1998), 135–59.
- 132 R. Ishihara, "Rising clouds, blowing winds: Late Classic Maya rain rituals in the Main Chasm, Aguateca, Guatemala", *World Archaeology* 40 (2008), 178–9.
- 133 P. Schaafsma ja K. Taube, "Bringing the rain: an ideology of rain making in the Pueblo Southwest and Mesoamerica", teoksessa J. Quilter (toim.), *A Pre-Columbian World: Searching for a Unitary Vision of Ancient America* (Washington, DC, 2006), 235–6, 256–9.
- 134 M. Cosmopoulos, *Bronze Age Eleusis and the Origins of the Eleusinian Mysteries* (Cambridge, 2015), 1–2.
- 135 Elvin, "Three thousand years of unsustainable growth", 17.
- 136 S. Dhammadika, *Nature and the Environment in Early Buddhism* (Singapore, 2015), 14.
- 137 P. Brancaccio, "Aṅgulimāla or the Taming of the Forest", *East and West* 49, 105–18.
- 138 Dhammadika, *Nature and the Environment*, 30.

- 139 R. Thapar, *Ashoka and the Decline of the Mauryas* (New Delhi, 1997), 250.
- 140 S. Dhammadika, *Middle Land, Middle Way: A Pilgrim's Guide to the Buddha's India* (Kandy, 2008), 150.
- 141 P. Olivelle, *King, Governance and Law in Ancient India: Kautilya's Arthashastra* (Oxford, 2013), 25–31; M. McLish, *The History of the Arthashastra: Sovereignty and Sacred Law in Ancient India* (Cambridge, 2019), 140–54.
- 142 Olivelle, *Kautilya's Arthashastra*, 99–100.
- 143 Ibid., 152–4.
- 144 Fisher, *Environmental History of India*, 68–9.
- 145 X. Yang, "Idealizing Wilderness in Medieval Chinese Poetry", teoksessa K. Gaul ja J. Hiltz (toim.), *Landscapes and Communities on the Pacific Rim: Cultural Perspectives from Asia to the Pacific Northwest* (Armonk, NY, 2000), 94–5.
- 146 Ksenophon, *Oikonomikos*, 5, 429.

AROT JA IMPERIUMIEN NOUSU

- 1 P. Crossley Kyle, *Hammer and Anvil: Nomad Rulers at the Forge of the Modern World* (Lanham, MD, 2019), 10–11.
- 2 P. Mitchell, *Horse Nations: The Worldwide Impact of the Horse on Indigenous Societies* (Oxford, 2015).
- 3 R. Sommer et al., "Holocene survival of the wild horse in Europe: A matter of open landscape?", *Journal of Quaternary Science* 26 (2011), 805–12; E. Sandoval-Castellanos et al., "Coat colour adaptation of post-glacial horses to increasing forest vegetation", *Nature Ecology & Evolution* 1 (2017), 1816–19.
- 4 M. Leonardi et al., "Late Quaternary horses in Eurasia in the face of climate and vegetation change", *Science Advances* 4 (2018), 1–11.
- 5 A. Outram et al., "The Earliest Horse Harnessing and Milking", *Science* 323 (2009), 1332–5.
- 6 I. Lazaridis et al., "Genomic insights into the origin of farming in the ancient Near East", *Nature* 536 (2016), 419–24; W. Taylor et al., "Early Pastoral Economies and Herding Transitions in Eastern Eurasia", *Scientific Reports* 10 (2020), 3; P. Librado et al., "The origins and spread of domestic horses from the Western Eurasian steppes", *Nature* (2021), 1–19.
- 7 V. Gening, G. Zdanovich ja V. Gening, Синтасhta: археологические памятники арийских племен Урало-Казахстанских степей (Chelyabinsk, 1992); K. Jones-Bley, "The Sintashta 'chariots'",

- teoksessa J. Davis-Kimball et al. (toim.), *Kurgans, Ritual Sites, and Settlements: Eurasian Bronze and Iron Age* (Oxford, 2000), 135–40; D. Owen, "The first equestrian: An Ur III glyptic scene", *Acta Sumerologica* 13 (1991), 259–73; D. Owen, "A Thirteen Month Summary Account from Ur", *Bulletin of the School of Oriental and African Studies* 43 (1980), 57–70.
- 8 J. Oates, "A note on the early evidence for horse and the riding of equids in Western Asia", teoksessa M. Levine, C. Renfrew ja K. Boyle (toim.), *Prehistoric Steppe Adaptation and the Horse* (Cambridge, 2003), 115–38.
- 9 S. Smith, "State and empire in the Middle and New Kingdoms", teoksessa J. Lustig (toim.), *Anthropology and Egyptology: A Developing Dialogue* (Sheffield, 1997), 66–89.
- 10 B. Sandor, "Tutankhamun's chariots: secret treasures of engineering mechanics", *Fatigue & Fracture of Engineering Materials & Structures* 27 (2004), 637–46.
- 11 A. Waley, *The Book of Songs* (Lontoo, 1954), 128–9.
- 12 E. Shaughnessy, "Historical Perspectives on the Introduction of the Chariot into China", *Harvard Journal of Asiatic Studies* 48 (1988), 189–237.
- 13 E. Shaughnessy, *Sources of the Western Zhou* (Berkeley, 1991), 81.
- 14 A. Pleterski, *Mitska stvarnost koroških knežjih kamnov* (Ljubljana, 1997), 39–40.
- 15 R. Sharma, "The Aryan Problem and the Horse", *Social Scientist* 21 (1993), 3–16.
- 16 W. Taylor, "A Bayesian chronology for early domestic horse use in the Eastern Steppe", *Journal of Archaeological Science* 81 (2017), 49–58.
- 17 R. Zaroff, "Āśvamedha – A Vedic horse sacrifice", *Studia Mythologica Slavica* 8 (2005), 74–8.
- 18 Taylor et al., "Early pastoral economies", 12; W. Taylor ja T. Tuvshinjragal, "Horseback riding, asymmetry, and changes to the equine skull: evidence for mounted riding in Mongolia's late Bronze Age", teoksessa L. Bartosiewicz ja E. Gal (toim.), *Care or Neglect? Evidence of Animal Disease in Archaeology* (Oxford, 2018), 134–54; U. Dietz, "Horseback riding: Man's access to speed", teoksessa Levine, Renfrew ja Boyle (toim.), *Prehistoric Steppe Adaptation and the Horse*, 189–99.
- 19 Taylor et al., "Early pastoral economies", 11.
- 20 K. Privat, "Preliminary report of palaeodietary analysis of human and faunal remains from Bolshekarakansky kurgan 25", teoksessa D. Zdanovich (toim.), Аркаим Некрополь (по материалам кургана 25 большекараганского могильника) (Chelyabinsk, 2002), 166–71.

- 21 Taylor et al., "Early pastoral economies", 13; X. Belauzaran et al., "Horse-meat for human consumption – Current research and future opportunities", *Meat Science* 108 (2015), 74–81.
- 22 E. Kuz'mina, Откуда пришли индоарии? (Moskova, 1994).
- 23 A. Ventresca Miller et al., "Pasture usage by ancient pastoralists in the northern Kazakh steppe informed by carbon and nitrogen isoscapes of contemporary floral biomes", *Archaeological and Anthropological Sciences* 11 (2019), 2151–66.
- 24 W. Honeychurch, *Inner Asia and the Spatial Politics of Empire: Archaeology, Mobility, and Culture Contact* (New York, 2015), 109–220.
- 25 M. Frachetti, "Seeds for the soul: ideology and diffusion of domesticated grains across inner Asia", teoksessa V. Mair ja J. Hickman, *Reconfiguring the Silk Road: New Research on East–West Exchange in Antiquity* (Philadelphia, 2014), 41–53.
- 26 R. Spengler et al., "Early agriculture and crop transmission among Bronze Age mobile pastoralists of Central Eurasia", *Proceedings of the Royal Society B* 281 (2014), 1–7.
- 27 N. Miller, R. Spengler ja M. Frachetti, "Millet cultivation across Eurasia: Origins, spread, and the influence of seasonal climate", *The Holocene* 26 (2016), 1566–75.
- 28 M. Frachetti, "Multiregional emergence of mobile pastoralism and nonuniform institutional complexity across Eurasia", *Current Anthropology* 53 (2012), 2–38. "Transeuraasialaisesta vaihtomekanismista" ks. A. Sherratt, "The Trans-Eurasian Exchange: The Prehistory of Chinese Relations with the West", teoksessa V. Mair (toim.), *Contact and Exchange in the Ancient World* (Honolulu, 2006), 30–61; T. Larsen Høisæter, "Polities and nomads: the emergence of the Silk Road exchange in the Tarim Basin region during late prehistory (2000–400 BCE)", *Bulletin of the School of Oriental and African Studies* 80 (2017), 339–63.
- 29 G. Gnechi-Ruscone et al., "Ancient genomic time transect from the Central Asian steppe unravels the history of the Scythians", *Scientific Advances* 7 (2021), 1–14.
- 30 J. Davis-Kimball, V. Bashilov ja L. Yablonsky (toim.), *Nomads of the Eurasian Steppe in the Early Iron Age* (Berkeley, 1995).
- 31 R. Spengler et al., "Linking agriculture and exchange to social developments of the Central Asian Iron Age", *Journal of Anthropological Archaeology* 48 (2017), 295–308.
- 32 B. Hanks, "Archaeology of the Eurasian Steppes and Mongolia", *Annual Review of Anthropology* 39 (2010), 469–86.

- 33 S. Wilkin et al., "Economic Diversification Supported the Growth of Mongolia's Nomadic Empires", *Scientific Reports* 10 (2020), 1–12.
- 34 W. Honeychurch ja C. Makarewicz, "The Archaeology of Pastoral Nomadism", *Annual Review of Anthropology* 45 (2016), 341–59.
- 35 Herodotus, *The Histories (Historiateos)*, 4.127, p. 277.
- 36 Ks. esim. U. Broszeder ja B. Miller, *Xiongnu Archaeology: Multidisciplinary Perspectives of the First Steppe Empire in Inner Asia* (Bonn, 2011); N. Kradin ja A. Ivliev, История Киданьской Империи ляо (Москва, 2014); H.-G. Hüttel ja U. Erdenebat, *Karabalgasun and Karakorum: Two Late Nomadic Urban Settlements in the Orkhon Valley* (Улаанбаатар, 2010).
- 37 L. Yuqi et al., "Early irrigation and agropastoralism at Mohuchahangoukou (MGK), Xinjiang, China", *Archaeological Research in Asia* 12 (2017), 23–32.
- 38 Huan Kuan, *Yan Tie Lun*, lainattu teoksessa Y. Yu, *Trade and Expansion in Han China: A Study in the Structure of Sino-Barbarian Economic Relations* (Berkeley, 1967), 40; Ammianus Marcellinus, *Rerum Gestarum Libri*, 31.2, 3, 382. Priscus, *Testimonia*, fragment 49, teoksessa R. Blockley (toim. ja käant.), *The Fragmentary Classicising Historians of the Later Roman Empire: Eunapius, Olympiodorus, Priscus, and Malchus*, 2 vols (Liverpool, 1981–3), 2, 356; A. Porter, *Mobile Pastoralism and the Formation of Near Eastern Civilisations* (Cambridge, 2011), 293.
- 39 B. Yang, "The Rise and Fall of Cowrie Shells: The Asian Story", *Journal of World History* 22 (2011), 1–25.
- 40 Herodotus, *The Histories (Historiateos)*, 4.46, 250.
- 41 D. Sneath, *The Headless State: Aristocratic Orders, Kinship Society, and Misrepresentations of Nomadic Inner Asia* (New York, 2007).
- 42 N. Anfinset, *Metal, Nomads and Culture Contacts, the Middle East and North Africa* (Lontoo, 2010), 81–7.
- 43 W. Honeychurch, "From Steppe Roads to Silk Roads", teoksessa R. Amitai ja M. Biran (toim.), *Nomads as Agents of Cultural Change: The Mongols and their Eurasian Predecessors* (Honolulu, 2014), 50–89. Ks. myös T. Barfield, *The Perilous Frontier: Nomadic Empires and China* (Oxford, 1992).
- 44 A. Khazanov, *Nomads and the Outside World* (Cambridge, 1984), 75, 104.
- 45 Y. Liu, "Exotica as prestige technology: the production of luxury gold in Western Han society", *Antiquity* 91 (2017), 1588–1602; P. Andreeva, "Re-making Animal Bodies in the Arts of Early China and North Asia: Perspectives from the Steppe", *Early China* (2022), 1–53.

- 46 J. Rawson, "Carnelian beads, animal figures and exotic vessels: traces of contact between the Chinese states and Inner Asia, *ca.* 1000–650 BC", teoksessa M. Wagner ja W. Wang (toim.), *Bridging Eurasia* (Berliini, 2010), 1–41.
- 47 T. Hayashi, "Griffin motif: from the West to East Asia via the Altai", *Parthica* 14 (2012), 49–64.
- 48 K. Peng ja Y. Zhu, "New Research on the Origins of Cowries used in Ancient China", *Sino-Platonic Papers* 68 (1995), 1–18; M. Dwivedi, "Tools of Economic Connectivity in Early Historic South Asia", teoksessa S. von Reden (toim.), *Handbook of Ancient Afro-Eurasian Economies*, 2 vols (Berliini, 2022), 2, erityisesti 501–3.
- 49 Y. Li, "On the Function of Cowries in Shang and Western Zhou China", *Journal of East Asian Archaeology* 5 (2003), 1–26.
- 50 D. Potts, *Nomadism in Iran: From Antiquity to the Modern Era* (Oxford, 2014), 419–30.
- 51 Ks. esim. B. Arbuckle ja E. Hammer, "The Rise of Pastoralism in the Ancient Near East", *Journal of Archaeological Research* 27 (2019), 391–449.
- 52 N. Di Cosmo, "The 'Birth' of the Silk Road between Ecological Frontiers and Military Innovation", teoksessa J. Lerner ja Y. Shi (toim.), *Silk Roads: From Local Realities to Global Narratives* (Oxford, 2020), 11–20.
- 53 Ibid.
- 54 Ibid. Ks. myös N. Di Cosmo, *Ancient China and its Enemies: The Rise of Nomadic Power in East Asian History* (Cambridge, 2002), erityisesti 138–55.
- 55 Thukydides, *History of the Peloponnesian War*, toim. C. Smith, 4 vols (Cambridge, 2014), 1, I.7–8, 12–14. Suomentanut J. A. Hollo: *Peloponnesolaissota*, WSOY 1964.
- 56 J. Bennett, "Retrodicting the Rise, Spread, and Fall of Large-Scale States in the Old World", *SocArViv Preprint* (2021), 1–27.
- 57 P. Turchin et al., "War, space, and the evolution of Old World complex societies", *PNAS* 110 (2013), 16,384–9.
- 58 P. Turchin, "A theory for the formation of large empires", *Journal of Global History* 4 (2009), 191–217.
- 59 N. Krardin, "Nomadism, Evolution and World-Systems: Pastoral Societies in Theories of Historical Development", *Journal of World-Systems Research* 8 (2002), 368–88; W. Scheidel, "The Xiongnu and the comparative study of empire", teoksessa B. Miller ja U. Grosseder (toim.), *Xiongnu Archaeology: Multidisciplinary Perspectives of the First*

- Steppe Empire in Inner Asia* (Bonn, 2011), 111–20; M. Byington, *The Ancient State of Puyō in Northeast Asia: Archaeology and Historical Memory* (Cambridge, MA, 2020).
- 60 Turchin et al., "War, space, and the evolution of Old World complex societies", 16, 384–9.
 - 61 W. Scheidel, "The scale of empire: territory, population, distribution", teoksessa P. Bang, C. Bayly ja W. Scheidel (toim.), *The Oxford World History of Empire*, 2 vols (Oxford, 2021), 2, 91–110.
 - 62 T. Currie et al., "Duration of agriculture and distance from the steppe predict the evolution of large-scale human societies in Afro-Eurasia", *Humanities and Social Sciences Communications* 7 (2020), 1–8.
 - 63 W. Scheidel, *Escape from Rome: The Failure of Empire and the Road to Prosperity* (Princeton, 2019), 281–90. T. Currie et al., 'Duration of agriculture and distance from the steppe predict the evolution of large-scale human societies in Afro-Eurasia', *Humanities and Social Sciences Communications* 7 (2020), 1–8.
 - 64 C. Yu Ko, M. Koyama ja T.-H. Sng, "Unified China and Divided Europe", *International Economic Review* 59 (2018), 285–327.
 - 65 H. Root, "Network assemblage of regime stability and resilience: Comparing Europe and China", *Journal of Institutional Economics* 13 (2017), 523–48.
 - 66 J. Fernández-Villaverde et al., "The Fractured Land Hypothesis", NBER Working Paper 27774 (2020), 1–64; for Lü Buwei, ks. J. Sellmann, *Master Lü's Spring and Autumn Annals (Lüshi Chunqiu)* (Albany, NY, 2002), 107.
 - 67 D. Gifford-Gonzalez, "Animal disease challenges to the emergence of pastoralism in sub-Saharan Africa", *African Archaeological Review* 17 (2000), 95–139.
 - 68 A. Wink, *The Making of the Indo-Islamic World, c.700–1800 CE* (Cambridge, 2020), erityisesti 8–123.
 - 69 A. Wink, "From the Mediterranean to the Indian Ocean: Medieval History in Geographic Perspective", *Comparative Studies in Society and History* 44 (2002), 419.
 - 70 Wink, *Making of the Indo-Islamic World*, 18–20.
 - 71 A. Wink, *Al-Hind: The Making of the Indo-Islamic World*, vol. 1: *Medieval India and the Expansion of Islam, 7th–11th Centuries* (Leiden 1990), 181–5.
 - 72 Wink, "From the Mediterranean to the Indian Ocean", 420.
 - 73 M. Mate, *A History of Water Management and Hydraulic Technology in India (1500 BC to 1800 AD)* (Delhi, 1998), 77.

- 74 *Ibn Battūṭa, al-Rihla*, käändt. H. Gibb, *The Travels of Ibn Battuta*, 4 vols (Cambridge, 1994), 3, 204; Wink, *Making of the Indo-Islamic World*, 21.
- 75 *Bābur-Nāma*, käändt. W. Thackston, *Memoirs of Babur, Prince and Emperor* (Lontoo, 2006), 334; Wink, *Making of the Indo-Islamic World*, 20.
- 76 J. Das Gupta, *Bengal in the Sixteenth Century AD* (Calcutta, 1914), 104.
- 77 Kauṭilya, *Arthaśāstra* 2.30; P. Olivelle, "Long-distance trade in ancient India: Evidence from Kauṭilya, *Arthaśāstra*", *Indian Economic and Social History Review* 57 (2020), 41–2.
- 78 J. Gommans, *Mughal Warfare: Indian Frontiers and High Roads to Empire, 1500–1700* (Lontoo, 2002); J. Gommans, "Warhorse and Post-Nomadic Empire in Asia, c. 1000–1800", *Journal of Global History* 2 (2007), 1–21.
- 79 Frankopan, *Silk Roads (Silkkiet)*, 234.
- 80 M. Green, "Climate and Disease in Medieval Eurasia", teoksessa *Oxford Research Encyclopedia of Asian History* (Oxford, 2018).
- 81 M. Green ja L. Jones, "The Evolution and Spread of Major Human Diseases in the Indian Ocean World", teoksessa G. Campbell ja E. Knoll (toim.), *Disease Dispersion and Impact in the Indian Ocean World* (Lontoo, 2020), 25–57.
- 82 C. Stanish, "The origin of state societies in South America", *Annual Review of Anthropology* 30 (2001), 41–64.
- 83 C. Spencer ja E. Redmond, "Primary State Formation in Mesoamerica", *Annual Review of Anthropology* 33 (2004), 173–99.
- 84 R. González Lauck, "Observaciones en torno a los contextos de la escultura olmeca en La Venta, Tabasco", teoksessa M. Uriarte ja K. Staines Cicero (toim.), *Acercarse y mirar: Homenaje a Beatriz de la Fuente* (Mexico City, 2004), 75–106.
- 85 K. Taube, "Los significados del jade", *Arqueología Mexicana* 133 (2015), 49–55.
- 86 A. Christenson, *Popul Vuh: Literal Poetic Version Translation and Transcription* (Winchester, 2003), 77–8.
- 87 Ibid., 197–8.
- 88 S. McIntosh, "Pathways to Complexity: An African Perspective", teoksessa S. McIntosh (toim.), *Beyond Chiefdoms: Pathways to Complexity in Africa* (Cambridge, 1999), 1–30.
- 89 S. Falconer ja C. Redman, *Polities and Power: Archaeological Perspectives on the Landscapes of Early States* (Tucson, AZ, 2009); R. McIntosh, *Ancient Middle Niger: Urbanism and the Self-Organising Landscape*

- (Cambridge, 2005); G. Connah, *African Civilisations: An Archaeological Perspective* (Cambridge, 2001).
- 90 McIntosh, "Pathways to Complexity: An African Perspective", 1–30.
- 91 K. Macdonald et al., "New Light on the Tichitt Tradition: A Preliminary Report on Survey and Excavation at Dhar Nema", teoksessa P. Mitchell, A. Haour ja J. Hobart (toim.), *Researching Africa's Past: New Contributions from British Archaeologists* (Oxford, 2003), 73–80.
- 92 A. LaViolette ja J. Fleischer, "The Archaeology of Sub-Saharan Urbanism: Cities and their Countrysides", teoksessa A. Brower Stahl (toim.), *African Archaeology: A Critical Introduction* (Oxford, 2004), 327–52.
- 93 A. Holl, "Coping with uncertainty: Neolithic life in the Dhar Tichitt-Walata, Mauritania (ca. 4000–2300 BP)", *Comptes Rendus Geoscience* 341 (2009), 703–12.
- 94 M. Ould Kattar, "Les sites Gangara, la fin de la culture Tichitt et l'origine de Ghana", *Journal des Africanistes* 65 (1995), 31–41; K. Macdonald, "Before the Empire of Ghana: pastoralism and the origins of cultural complexity in the Sahel", teoksessa G. Connah (toim.), *Transformations in Africa: Essays on Africa's Later Past* (Leicester, 1998), 71–103.
- 95 J. Monroe, "'Elephants for Want of Towns': Archaeological Perspectives on West Africa Cities and Their Hinterlands", *Journal of Archaeological Research* 26 (2018), 387–446.
- 96 Herodotos, *The Histories (Historiateos)*, 4.45, 249–50.
- 97 Cicero, *De legibus*, toim. C. Keyes (Cambridge, 2000), I, 300. Suomentanut Veli-Matti Rissanen: *Laeista*, WSOY 2004. Plutarkhos, "De Herodoti malignitate", *Moralia*, käändt. L. Pearson (Loeb, 1965).
- 98 D. Leslie ja K. Gardiner, *The Roman Empire in Chinese Sources* (Rome, 1996), 98.
- 99 Zaroff, "Aśvamedha", 79–81.
- 100 Polybios, *Histories*, toim. C. Habicht, 8 vols (Cambridge, MA, 2014), 1.3, 8–9. Teoksessa lainatut suomennokset ovat Eemil Kankaanpään julkaisemattomia käänöksiä.
- 101 R. Sugirtharajah, *The Bible and Asia: From the Pre-Christian Era to the Postcolonial Age* (Cambridge, MA, 2013), 28–30.
- 102 N. Cohn, *Cosmos, Chaos, and the World to Come: The Ancient Roots of Apocalyptic Faith* (New Haven, 1993), 77–104, 26–8.
- 103 A. Mariaselvam, *The Song of Songs and Ancient Tamil Love Poems: Poetry and Symbolism* (Rome, 1988).

- 104 Sugirtharajah, *The Bible and Asia*, 44–5.
- 105 Pausanias, 4.32.4.
- 106 Empedokles, *Extant Fragments*, 117, 127.
- 107 D. Pingree, "On the Greek Origin of the Indian Planetary Model Employing a Double Epicycle", *Journal for the History of Astronomy* 2 (1971), 80–5; D. Pingree, "The Recovery of Early Greek Astronomy from India", *Journal for the History of Astronomy* 7 (1976), 109–23.
- 108 A. Deter-Wolf et al., "The world's oldest tattoos", *Journal of Archaeological Science: Reports* 5 (2016), 19–24.
- 109 C. Reed, "Tattoo in Early China", *Journal of the American Oriental Society* 120 (2000), 360–76.
- 110 J. Huehnergard ja H. Liebowitz, "The Biblical Prohibition against Tattooing", *Vetus Testamentum* 63 (2013), 59–77.
- 111 C. Jones, "Stigma: Tattooing and Branding in Graeco-Roman Antiquity", *Journal of Roman Studies* 77 (1987), 139–55.
- 112 P. Temin, "Price Behavior in Ancient Babylon", *Explorations in Economic History* 39 (2002), 46–60.
- 113 G. Campbell, *Africa and the Indian Ocean World from Early Times to Circa 1900* (Cambridge, 2019), 43–4.
- 114 J. Dorey et al., "Holocene population expansion of a tropical bee coincides with real human colonisation of Fiji rather than climate change", *Molecular Ecology* 30 (2021), 1–38.
- 115 M. Hurles et al., "The Dual Origin of the Malagasy in Island Southeast Asia and East Africa: Evidence from Maternal and Paternal Lineages", *American Journal of Human Genetics* 76 (2005), 894–901.
- 116 A. Adelaar, "Asian roots of the Malagasy: a linguistic perspective", *Bijdragen tot de Taal-, Land- en Volkenkunde*, 151 (1995), 325–56.
- 117 R. Grollemund et al., "Bantu expansion shows that habitat alters the route and pace of human dispersals", *PNAS* 112 (2015), 13,296–301.
- 118 P. Pollegioni et al., "Ancient Humans Influenced the Current Spatial Genetic Structure of Common Walnut Populations in Asia", *Plos One* 10 (2015), 1–16.
- 119 R. Spengler et al., "Exaptation Traits for Megafaunal Mutualisms as a Factor in Plant Domestication", *Frontiers in Plant Science* 12 (2021), 1–14.
- 120 R. Power et al., "Asian Crop Dispersal in Africa and Late Holocene Human Adaptation to Tropical Environments", *Journal of World Prehistory* 32 (2019), 353–92.

- 121 F. Aubalie, "Pathways of diffusion of some plants and animals between Asia and the Mediterranean region", *Revue d'Ethnoécologie* 1 (2012), 1–26.

ROOMAN AJAN LÄMMIN KAUSI

- 1 D. Crawford, "Ptolemy, Ptah and Apis in Hellenistic Memphis", teoksessa D. Crawford, J. Quaegebeur ja W. Clarysse (toim.), *Studies on Ptolemaic Memphis* (Leuven, 1980), 1–41.
- 2 J. Manning et al., "Volcanic suppression of Nile summer flooding triggers revolt and constrains interstate conflict in ancient Egypt", *Nature Communications* 8 (2017), 1–9. Maakaupoista ks. J. Manning, *Land and Power in Ptolemaic Egypt: The Structure of Land Tenure* (Cambridge, 2003).
- 3 G. Hölbl, *Geschichte des Ptolemäerreiches: Politik, Ideologie und religiöse Kultur von Alexander dem Grossen bis zur römischen Eroberung* (Darmstadt, 1994).
- 4 P. Hordern ja N. Purcell, *The Corrupting Sea: A Mediterranean History* (Oxford, 2000).
- 5 J. McConnell et al., "Extreme climate after massive eruption of Alaska's Okmok volcano in 43 BCE and effects on the late Roman Republic and Ptolemaic Kingdom", *PNAS* 117 (2020), 15,443–9.
- 6 Manning, "Volcanic suppression of Nile summer flooding", 1–9.
- 7 McConnell, "Extreme climate after massive eruption", 15,443–9.
- 8 S. Strunz ja O. Braeckel, "Did volcano eruptions alter the trajectories of the Roman Republic and the Ptolemaic Kingdom? Moving beyond black-box determinism", *PNAS* 117 (2020), 32,207–8.
- 9 S. Ager, "Familiarity Breeds: Incest and the Ptolemaic Dynasty", *Journal of Hellenic Studies* 125 (2005), 1–34; S. Ager, "The Power of Excess: Royal Incest and the Ptolemaic Dynasty", *Anthropologica* 48 (2006), 165–86.
- 10 M. Chauveau, *L'Egypte au temps de Cléopatre* (Pariisi, 1997).
- 11 L. Borges, *Le Conflit propagandiste entre Octavien et Marc Antoine: De l'usage politique de la uituperatio entre 44 et 30 a. C. n* (Brussels, 2016).
- 12 Scheidel, *Escape from Rome*, 51–88.
- 13 Hordern ja Purcell, *The Corrupting Sea*.
- 14 N. Roberts et al., "The Mid-Holocene climatic transition in the Mediterranean: Causes and consequences", *The Holocene* 21 (2011), 3–13.
- 15 V. Nieto-Moreno et al., "Tracking climate variability in the western Mediterranean during the Late Holocene: a multiproxy approach", *Climate of the Past* 7 (2011), 1395–1411; myös G. Margaritelli et al., "Persistent warm Mediterranean surface waters during the Roman period", *Scientific Reports* 10 (2020), 1–10.

- 16 K. Harper ja M. McCormick, "Reconstructing the Roman climate", teoksessa W. Scheidel (toim.), *The Science of Roman History* (Princeton, 2018), 11–52.
- 17 McCormick et al., "Climate Change during and after the Roman Empire", 169–220; ks. myös P. Erdkamp, *The Grain Market in the Roman Empire* (Cambridge, 2005).
- 18 Fan Ye, teoksessa J. Holmgren, *Chinese Colonisation of Northern Vietnam: Administrative Geography and Political Development in the Tongking Delta, First to Sixth Centuries AD* (Canberra, 1980), 5–6.
- 19 K. DuVal, "The Mississippian Peoples' Worldview", teoksessa Raaflaub ja Talbert, *Geography and Ethnography*, 90; B. Smith, "The Archaeology of the Southeastern United States: from Dalton to De Soto, 10,500–500 BP", *Advances in World Archaeology* 5 (1986), 21, 35–51.
- 20 G. Cowgill, *Ancient Teotihuacan: Early Urbanism in Central Mexico* (New York, 2015).
- 21 D. Carballo, "The Social Organisation of Craft Production and Interregional Exchange at Teotihuacan", teoksessa K. Hirth ja J. Pilsbury (toim.), *Merchants, Markets, and Exchange in the Pre-Columbian World* (Washington, DC, 2013), 113–40.
- 22 L. Manzanilla, "Cooperation and tensions in multiethnic corporate societies using Teotihuacan, Central Mexico, as a case study", *PNAS* 112 (2015), 9210–15; B. Álvarez-Sandoval et al., "Genetic evidence supports the multiethnic character of Teopancatzco, a neighborhood center of Teotihuacan, Mexico (AD 200–600)", *Plos ONE* 10 (2015), 1–19; N. Sugiyama et al., "¿Artistas mayas en Teotihuacan?", *Arqueología Mexicana* 142 (2016), 8.
- 23 J. Urrutia-Fucugauchi, "Archaeomagnetic dating of the eruption of Xitle volcano, Basin of Mexico: Implications for the Mesoamerican centers of Cuicuilco and Teotihuacan", *Arqueología Iberoamericana* 30 (2016), 23–9.
- 24 S. Sugiyama, "Worldview Materialized in Teotihuacan, Mexico", *Latin American Antiquity* 4 (1993), 103–29.
- 25 Scheidel, *Escape from Rome*, 308–11.
- 26 Cicero, *De officiis*, 1.72–3. Suomentanut Marja Itkonen-Kalla: "Velvollisuksista", *Vanhuudesta. Ystävyydestä. Velvollisuksista*, Laatukirjat 1967.
- 27 Cicero, *Letter to his Brother Quintus*, 1.1.44.
- 28 Cicero, *De officiis*, 1.42 (Vanhuudesta. Ystävyydestä. Velvollisuksista).
- 29 M. van der Veen ja J. Morales, "Food Globalisation and the Red Sea: New Evidence from the Ancient Ports at Quseir al-Qadim, Egypt",

- teoksessa D. Agius et al (toim.), *Human Interaction with the Environment in the Red Sea* (Leiden, 2017), 254–89.
- 30 Plinius, *Historia naturalis*, toim. D. Eichholz, 10 vols (Cambridge, MA, 1962), 36.109–10.
- 31 J. Watts Belser, "Opulence and Oblivion: Talmudic Feasting, Famine and the Social Politics of Disaster", *AJS Review* 38 (2014), 89–107.
- 32 E. Zanda, *Fighting Hydra-Like Luxury: Sumptuary Regulation in the Roman Republic* (Lontoo, 2011).
- 33 K. Lapatin, "Luxus", teoksessa C. Mattusch (toim.), *Pompeii and the Roman Villa: Art and Culture around the Bay of Naples* (Lontoo, 2008), 31–52.
- 34 Juvenalis, Satire, 10, teoksessa S. Morton Brand (toim.), *Juvenal and Persius* (Cambridge, MA, 2004), 372.
- 35 Seneca, *Epistles* 104, 192. Suomentanut Antti T. Oikarinen: *Kirjeet Luciliukselle*, Basam Books 2016.
- 36 J. McConnell et al., "Lead pollution recorded in Greenland ice indicates European emissions tracked plagues, wars, and imperial expansion during antiquity", *PNAS* 115 (2018), 5726–31.
- 37 Hughes, *Environmental Problems*, 68.
- 38 Plinius, *Historia naturalis*, 33.1, 9, 2–4.
- 39 Platon, *Critias*, III, teoksessa R. Bury (toim. ja käant.), *Plato: Timaeus. Critias. Cleitophon. Menexenus. Epistles* (Cambridge, MA, 1929). Suomentaneet Marja Itkonen-Kaila, A. M. Anttila ja Marianna Tyni: "Kritias", *Teokset*, 5. osa, Otava 1982; A. Taylor, *Plato: Timaeus and Critias* (Cambridge, MA, 1929), 272.
- 40 Theophrastus, *De causis plantarum*, 5.14, toim. ja käant. B. Einarson and G. Link, 3 vols (Cambridge, 2014), 3, 130–2.
- 41 Lucretius, *De natura rerum*, V.821–30.
- 42 Columella, *De re rustica*, Preface, toim. ja käant. H. Boyd, *On Agriculture* (Cambridge, MA, 1941), 2–4.
- 43 J. Mehta, *Vedic Wisdom: Selected Verses from the Vedas for Material Gain and Spiritual Happiness* (New Delhi, 2012), 140.
- 44 Kohelet Rabbah, 7:13.
- 45 Kaibara Ekken, *Ekken zenshū*, teoksessa W. T. de Bary, C. Gluck ja A. Tiedemann (toim.), *Sources of Japanese Tradition, 1600–1868* (New York, 2006), 99–100.
- 46 W. Harris, "Defining and detecting Mediterranean deforestation, 800 BCE to 700 CE", teoksessa W. Harris (toim.), *The Ancient Mediterranean Environment between Science and History* (Leiden, 2013), 173–94.

- 47 N. Morley, "Population size and social structure", teoksessa P. Erdkamp (toim.), *The Cambridge Companion to Ancient Rome* (Cambridge, 2013), 29–44.
- 48 Rooman demografisista trendeistä ks. P. Turchin ja W. Scheidel, "Coin hoards speak of population declines in Ancient Rome", *PNAS* 106 (2009), 17,276–9.
- 49 B. Graham ja R. Van Dam, "Modelling the Supply of Wood Fuel in Ancient Rome", teoksessa A. Izdebski ja M. Mulryan (toim.), *Environment and Society in the Long Late Antiquity* (Leiden, 2018), 148–9.
- 50 P. Squatriti, "Rye's Rise and Rome's Fall: Agriculture and Climate in Europe during Late Antiquity", *ibid.*, 160.
- 51 P. Halstead, "The Contribution of Zooarchaeology", teoksessa P. Erdkamp ja C. Holleran (toim.), *The Routledge Handbook to Diet and Nutrition in the Roman World* (Lontoo, 2019), 64–76.
- 52 P. Malanima, "Energy Consumption in the Roman World", teoksessa Harris (toim.), *Ancient Mediterranean Environment*, 13–36. Myös V. Smil, *America is Not a New Rome* (Cambridge, MA, 2010), 107–13; D. Van Limbergen, "What Romans ate and how much they ate of it: Old and new research on eating habits and dietary proportions in classical antiquity", *Revue Belge de Philologie et d'Histoire* 96 (2018), 1049–92.
- 53 W. Harris, "Bois et déboisement dans la Méditerranée antique", *Annales Histoire Science Sociale* 66 (2011), 105–40.
- 54 R. Gowland ja P. Garnsey, "Skeletal evidence for health, nutritional status and malaria in Rome and the Empire", teoksessa H. Eckardt (toim.), *Roman Diasporas: Archaeological Approaches to Mobility and Diversity in the Roman Empire* (Portsmouth, 2010), 1; Hughes, *Environmental Problems*, 104.
- 55 Van Limbergen, "What Romans ate".
- 56 Cassius Dio, 58.15.
- 57 C. Lo Giudice, "L'impiego degli animali negli spettacoli romani: *venatio e damnatio ad bestias*", *Italies* 12 (2008), 361–95.
- 58 A. Rodrigues et al., "Forgotten Mediterranean calving grounds of grey and North Atlantic right whales: evidence from Roman archaeological records", *Proceedings of the Royal Society B* 285 (2018), 1–9.
- 59 Malanima, "Energy Consumption", 22–4.
- 60 A. Marzano, *Harvesting the Sea: The Exploitation of Marine Resources in the Roman Mediterranean* (Oxford, 2013).
- 61 S. Corcoran, *The Empire of the Tetrarchs: Imperial Pronouncements and Government AD 284–324* (Oxford, 2000), 205–33.

- 62 P. Erdkamp, "War, Food, Climate Change, and the Decline of the Roman Empire", *Journal of Late Antiquity* 12 (2019), 437–8.
- 63 D. Edwards, "Meroe and the Sudanic Kingdoms", *Journal of African History* 39 (1998), 175–93. Myös J. Goody, *Technology, Tradition and the State in Africa* (Lontoo, 1971).
- 64 Elvin, "Three thousand years of unsustainable growth", 24.
- 65 Ibid., 25.
- 66 M. Hinkel, "The water reservoirs in Ancient Sudan", teoksessa C. Bonnet (toim.), *Etudes Nubiennes*, 2 vols (Geneva, 1994), 2, 171–6.
- 67 J. Crow, J. Bardill ja R. Bayliss, *The Water Supply of Byzantine Constantinople* (Lontoo, 2008).
- 68 G. Sürmelihindi et al., "Carbonates from the ancient world's longest aqueduct: A testament of Byzantine water management", *Geoarchaeology* 36 (2021), 643–59.
- 69 Scarborough, "Ecology and Ritual", 139–45.
- 70 P. Harrison, "Aspects of Water Management in the Southern Lowlands", teoksessa V. Scarborough ja B. Isaac (toim.), *Aspects of Water Management in the Prehispanic New World* (Greenwich, CT, 1993), 71–120.
- 71 W. Jongman, J. Jacobs ja G. Klein Goldewijk, "Health and wealth in the Roman Empire", *Economics and Human Biology* 34 (2019), 138–50.
- 72 W. Scheidel, "Germs for Rome", teoksessa C. Edwards ja G. Woolf (toim.), *Rome the Cosmopolis* (Cambridge, 2003), 158–76.
- 73 McConnell et al., "Lead pollution", 5728; K. Harper, "Pandemics and passages to late antiquity; rethinking the plague of c.249–270 described by Cyprian", *Journal of Roman Archaeology* 28 (2015), 223–60; S. Huebner, "The 'Plague of Cyprian': A revised view of the origin and spread of a 3rd CE pandemic", *Journal of Roman Archaeology* 34 (2021), 151–74.
- 74 W. Scheidel, "A model of demographic and economic change in Roman Egypt after the Antonine plague", *Journal of Roman Archaeology* 15 (2002), 97–114; ks. kuitenkin myös W. Scheidel, "Roman wellbeing and the economic consequences of the Antonine Plague", teoksessa E. Lo Cascio (toim.), *L'impatto della "peste Antonina"* (Bari, 2012), 265–95.
- 75 B. Rossignol ja S. Durost, "Volcanisme global et variations climatiques de courte durée dans l'histoire romaine (Ier av. J.-C.–IVème ap. J.-C.): leçons d'une archive glaciaire (GISP2)", *Jahrbuch des römisch-germanischen Zentralmuseums Mainz* 54 (2007), 395–438.
- 76 McCormick et al., "Climate Change during and after the Roman Empire", 169–220.

- 77 K. Harper, *The Fate of Rome: Climate, Disease and the End of an Empire* (Princeton, 2017), 15.
- 78 A. Izdebski, "Realising Consilience: How Better Communication between Archaeologists, Historians and Natural Scientists Can Transform the Study of Past Climate Change in the Mediterranean", *Quaternary Science Reviews* 136 (2016), 5–22.
- 79 Erdkamp, "War, Food, Climate Change", 448.
- 80 F. Virkus, *Politische Strukturen im Guptareich (300–500 n. Chr)* (Wiesbaden, 2014); D. Bhandarkar, B. Chhabra ja G. Gai, *Inscriptions of the Gupta Kings* (New Delhi, 1981).
- 81 Ks. yleisesti N. Taleb, *Fooled by Randomness: The Hidden Role of Chance in Life and the Markets* (Lontoo, 2007).
- 82 S. Esmonde Cleary, *The Roman West, AD 200–500: An Archaeological Study* (Cambridge, 2013), 455–82.
- 83 P. Sarris, "Integration and Disintegration in the Late Roman Economy: The Role of Markets, Emperors, and Aristocrats", teoksessa L. Lavan (toim.), *Local Economies? Production and Exchange of Inland Regions in Late Antiquity* (Leiden, 2015), 167–88.
- 84 P. Erdkamp, "War, Food, Climate Change, and the Decline of the Roman Empire", *Journal of Late Antiquity* 12 (2019), 422–65.
- 85 P. Sheppard et al., "Annual precipitation since 515 BC reconstructed from living and fossil juniper growth of Northeast Qinghai Province, China", *Climate Dynamics* 23 (2004), 869–81.
- 86 P. Heather, *The Fall of the Roman Empire: A New History of Rome and the Barbarians* (Oxford, 2006).
- 87 M. McCormick, "Radiocarbon dating the end of urban services in a late Roman town", *PNAS* 116 (2019), 8096–8; A. Boozer, "The Urbanisation of Egypt's Western Desert under Roman Rule", teoksessa M. Sterry ja D. Mattingly (toim.), *Urbanisation and State Formation in the Ancient Sahara and Beyond* (Cambridge, 2020), 147–86; C. Wickham, *The Inheritance of Rome: A History of Europe from 400 to 1000* (Lontoo, 2009).
- 88 D. Edwards, "The Archaeology of Sudan and Nubia", *Annual Review of Anthropology* 36 (2007), 211–28.
- 89 S. Hakenbeck et al., "Practising pastoralism in an agricultural environment: An isotopic analysis of the Hunnic incursions on Pannonian populations", *PLOS One* 12 (2017), 1–25.
- 90 Science Daily, "Tiller the Hun? Farmers in Roman Empire converted to Hun lifestyle – and vice versa", 22.3.2017.
- 91 Z. Safrai, "Where are the fifth-century coins?", *Israel Numismatic Journal* 18 (2011–14), 198–208.

- 92 D. Fuks et al., "Dust clouds, climate change and coins: consilences of paleoclimate and economy in the Late Antique southern Levant", *Journal for the Council for British Research in the Levant* 49 (2017), 205–33.
- 93 U. Schamiloglu, "Climate Change in Central Eurasia and the Golden Horde", *Golden Horde Review* 1 (2016), 9–10.
- 94 E. Cook, "Megadroughts, ENSO, and the invasion of Late-Roman Europe by the Huns and Avars", teoksessa Harris (toim.), *Ancient Mediterranean Environment*, 89–102.
- 95 Y. Zou, "The decline of Pingcheng: climate change impact, vulnerability and adaptation in the Northern Wei dynasty, China", *Journal of Historical Geography* 58 (2017), 12–22.
- 96 D. Wang, *Longmen's Stone Buddhas and Cultural Heritage: When Antiquity Met Modernity in China* (Lanham, MD, 2020).
- 97 Sen, *Poverty and Famines*. Ks. myös P. Slavin, "Climate and famines: a historical reassessment", *WIREs Climate Change* 7 (2016), 433–47.

MYÖHÄISANTIIKIN KRIISI

- 1 Z. Zhang et al., "Periodic temperature-associated drought/flood drives locust plagues in China", *Proceedings of the Royal Society B* 276 (2009), 823–31; L. Stige et al., "Thousand-year-long Chinese time series reveals climatic forcing of decadal locust dynamics", *PNAS* 103 (2007), 16,188–93.
- 2 Z. Zhang ja D. Li, "A possible relationship between outbreaks of the oriental migratory locust (*Locusta migratoria manilensis* Meyen) in China and the El Niño episodes", *Ecological Research* 14 (1999), 267–70.
- 3 R. Brázdil et al., "Past locust outbreaks in the Czech lands: do they indicate particular climate patterns?", *Theoretical and Applied Climatology* 116 (2014), 343–57.
- 4 *Chandogyya Upaniṣad*.
- 5 Plinius, *Historia naturalis*, I.II; D. Camuffo ja S. Enzi, "Locust Invasions and Climatic Factors from the Middle Ages to 1800", *Theoretical and Applied Climatology* 43 (1991), 48–9.
- 6 N. Stenseth, "Plague dynamics are driven by climate variation", *PNAS* 103 (2006), 13,110–15.
- 7 R. Sallares, A. Bouwman ja C. Anderung, "The Spread of Malaria to Southern Europe in Antiquity: New Approaches to Old Problems", *Medical History* 48 (2004), 311–28.
- 8 A. Richter, *Letters and Epistolary Culture in Early Medieval China* (Seattle, 2013), 90–1.

- 9 A. Chepstow-Lusty et al., "Tracing 4,000 Years of Environmental History in the Cuzco Area, Peru, from the Pollen Record", *Mountain Research and Development* 18 (1998), 159–72.
- 10 S. Ingram, "Settlement ecology in the precontact North American Southwest", teoksessa L. Kellett ja E. Jones (toim.), *Settlement Ecology of the Ancient Americas* (Abingdon, 2017), 85–110.
- 11 A. Osborn, "Snowblind in the Desert Southwest: Moisture Islands, Ungulate Ecology, and Alternative Prehistoric Overwintering Strategies", *Journal of Anthropological Research* 49 (1993), 135–64.
- 12 B. Onac et al., "Late Holocene droughts and cave ice harvesting by Ancestral Puebloans", *Scientific Reports* 10 (2020).
- 13 F. Ljungqvist, "A new reconstruction of temperature variability in the extra-tropical northern hemisphere during the last two millennia", *Geografiska Annaler: Series A. Physical Geography* 92 (2010), 339–51.
- 14 M. Lachniet, "ad 550–600 Collapse at Teotihuacan", teoksessa Weiss (toim.), *Megadrought*, 195–6.
- 15 G. Cowgill, "An update on Teotihuacan", *Antiquity* 82 (2008), 962–75; P. Plunket ja G. Urunuela, "Social and cultural consequences of a late Holocene eruption of Popocatepetl in central Mexico", *Quaternary International* 151 (2006), 19–28.
- 16 U. Büntgen, "2500 Years of European Climate Variability and Human Susceptibility", *Science* 331 (2011), 578–82.
- 17 Y. Garcin et al., "Early anthropogenic impact on Western Central African rainforests 2,600 y ago", *PNAS* 115 (2018), 3261–6; P. Giresse et al., "Understanding the 2500 yr BP rainforest crisis in West and Central Africa in the framework of the Late Holocene: Pluridisciplinary analysis and multi-archive reconstruction", *Global Planetary Change* 192 (2020), 1–19.
- 18 D. Seidensticker et al., "Population collapse in Congo rainforest from 400 CE urges reassessment of the Bantu Expansion", *Science Advances* 7 (2021), 1–13.
- 19 Squatriti, "Rye's Rise and Rome's Fall", 160–9.
- 20 W. Swartz, "There's No Place Like Home: Xie Lingyun's representation of his estate in 'Rhapsody on Dwelling in the Mountains'", *Early Medieval China* 21 (2015), 21–37.
- 21 I. Nilsson, "Nature Controlled by Artistry: The Poetics of the Literary Garden in Byzantium", teoksessa H. Bodin ja R. Hedlund (toim.), *Byzantine Gardens and Beyond* (Uppsala, 2013), 15–29; D. Fairchild Ruggles, *Islamic Gardens and Landscapes* (Philadelphia, 2008); HRH The Prince of Wales, *Highgrove: An English Country Garden* (Lontoo,

- 2015); C. Clunas, *Fruitful Sites: Garden Culture in Ming Dynasty China* (Lontoo, 2004), 16–18.
- 22 J. Elverskog, *The Buddha's Footprint: An Environmental History of Asia* (Philadelphia, 2020), 51–3; L. Lancaster, "Buddhism and Ecology: Collective Cultural Perceptions", teoksessa M. Tucker ja D. Williams (toim.), *The Interconnection of Dharma and Deeds* (Cambridge, MA, 1997), 3–20.
- 23 F. Orsini, "Clouds, Cuckoos and an Empty Bed: Emotions in Hindi-Urdu *Barahmasas*", teoksessa I. Rajamani, M. Pernau ja K. Butler Schofield (toim.), *Monsoon Feelings: A History of Emotions in the Rain* (New Delhi, 2018), 97–136.
- 24 R. Inden, "Imperial Purāṇas. Kashmire as Vaisnava Center of the World", teoksessa R. Inden, J. Walters ja D. Ali (toim.), *Querying the Medieval: Texts and the History of Practices in South Asia* (Oxford, 2000), 29–98.
- 25 G. Hidas, *Mahāpratisarā-Mahāvidyārājñī: The Great Amulet, Great Queen of Spells. Introduction, Critical Editions and Annotated Translation* (New Delhi, 2012), 224.
- 26 G; Hildas, *A Buddhist ritual manual on agriculture: Vajratuṇḍasamayakalparāja – critical edition* (Berliini, 2019), 11–22.
- 27 B. Goodman-Tchernov ja J. Austin, "Deterioration of Israel's Caesarea Maritima's ancient harbor linked to repeated tsunami events identified in geophysical mapping of offshore stratigraphy", *Journal of Archaeological Science: Reports* 3 (2015), 444–54; H. Dey, B. Goodman-Tchernov ja J. Sharvit, "Archaeological evidence for the tsunami of January 18, A.D. 749: a chapter in the history of Early Islamic Qâysariyah (Caesarea Maritima)", *Journal of Roman Archaeology* 27 (2014), 357–73.
- 28 Ammianus Marcellinus, *Res gestae*, 26.10.
- 29 R. Ott et al., "Reassessing Eastern Mediterranean Tectonics and Earthquake Hazard from the 365 CE Earthquake", *AGU Advances* 2 (2021), 1–18. For a discussion of the trustworthiness of Ammianus' account, G. Kelly, "Ammianus and the Great Tsunami", *Journal of Roman Studies* 94 (2004), 141–67.
- 30 D. Pedrazzi et al., "The Ilopango Tierra Blanca Joven (TBJ) eruption, El Salvador: Volcano-stratigraphy and physical characterization of the major Holocene event of Central America", *Journal of Volcanology and Geothermal Research* 377 (2019), 81–102.
- 31 V. Smith et al., "The magnitude and impact of the 431 CE Tierra Blanca Joven eruption of Ilopango, El Salvador", *PNAS* 117 (2020), 26,061–8.

- 32 E. Cook, "Megadroughts, ENSO and the invasion of Late-Roman Europe by the Huns and Avars", teoksessa W. Harris (toim.), *The Ancient Mediterranean Environment between Sciences and History* (Leiden, 2013), 88–102.
- 33 McCormick, "Climate Change during and after the Roman Empire", 191–5.
- 34 Polybios, *The Rise of the Roman Empire*, käännt. I. Scott-Kilvert (Lontoo, 1979), VI, 304.
- 35 U. Büntgen et al., "Cooling and societal change during the Late Antique Little Ice Age from 536 to around 660 AD", *Nature Geoscience* 9 (2016), 231–6.
- 36 M. Sigl et al., "Timing and climate forcing of volcanic eruptions for the past 2500 years", *Nature* 523 (2015), 543–9.
- 37 S. Helama et al., "Volcanic dust veils from sixth century tree-ring isotopes linked to reduced irradiance, primary production and human health", *Scientific Reports* 8 (2018), 1–11.
- 38 Smith, "Magnitude and impact", 26061–8; R. Dull et al., "Radiocarbon and geologic evidence reveal Ilopango volcano as source of the colossal 'mystery' eruption of 539/40 CE", *Quaternary Science Reviews* 222 (2019), 1–17.
- 39 Mani, Tzachor ja Cole, "Global catastrophic risk", 1–5.
- 40 S. Fecht, "Undersea volcanism may help explain medieval year of darkness", <https://phys.org/news/2019-12-undersea-volcanism-medieval-year-darkness.html>
- 41 Harper, *Fate of Rome*, 219. Ks. Sigl et al., "Timing and climate forcing of volcanic eruptions", 543–9.
- 42 P. Sarris, "Climate and Disease", teoksessa E. Hermans (toim.), *A Companion to the Global Early Middle Ages* (Amsterdam, 2020), 511–38.
- 43 M. Toohey et al., "Climatic and societal impacts of a volcanic double event at the dawn of the Middle Ages", *Climate Change* 136 (2016), 401–12.
- 44 Helama, "Volcanic dust veils", 2.
- 45 T. Newfield, "The Climate Downturn of 536–50", teoksessa White, Pfister ja Mauelshagen (toim.), *Palgrave Handbook of Climate History*, 470.
- 46 Sarris, "Climate and Disease", 515.
- 47 R. Sinensky et al., "Volcanic climate forcing, extreme cold and the Neolithic Transition in the northern US Southwest", *Antiquity* 96 (2021), 123–41.

- 48 M. Axboe, "Guld og gulder", teoksessa T. Capelle ja C. Fischer (toim.), *Ragnarok. Odins verden* (Silkeborg, 2005), 41–56.
- 49 B. Gräslund ja N. Price, "Twilight of the gods? The 'dust veil event' of AD 536 in critical perspective", *Antiquity* 86 (2012), 431–2; Price ja Gräslund, "Excavating the Fimbulwinter? Archaeology, geomythology and the climate event(s) of AD 536", teoksessa F. Riede (toim.), *Past Vulnerability: Volcanic Eruptions and Human Vulnerability in Traditional Societies Past and Present* (Aarhus, 2015), 109–32.
- 50 B. Gräslund, "Fimbulvintern. Ragnarök och klimatkrisen år 536–7", *Saga och Sed* (2007), 93–123.
- 51 Ks. Büntgen, "Cooling and societal change", 231–6; Harper, *Fate of Rome*, 42–5.
- 52 F. Virkus, *Politische Strukturen im Guptareich (300–550 n. Chr)* (Wiesbaden, 2004), 166–9; J. Mitchiner (toim.), *The Yuga Purana* (Kolkata, 2002), 103; Stoneman, *Greek Experience*, 163–4.
- 53 J. Elverskog, *Buddhism and Islam on the Silk Road* (Philadelphia, 2010), 29–30; R. Singh, "The decline of Pātaliputra with special reference to geographical factors", *Proceedings of the Indian History Congress* 36 (1975), 51–62.
- 54 Sarris, "Climate and Disease", 528.
- 55 F. Chayette, "The Disappearance of the Ancient Landscape and the Climate Anomaly of the Early Middle Ages: A Question to be Pursued?", *Early Medieval Europe* 16 (2008), 127–65; P. Sarris, *Empires of Faith: The Fall of Rome to the Rise of Islam* (Oxford, 2011), 75–6.
- 56 M. Ramakrishna Bhat, *Varāhamihira's Brhat Samhita* (Delhi, 1997), 328–9.
- 57 P. Dundas, "Floods, Taxes, and a Stone Cow: A Jain Apocalyptic Account of the Gupta Period", *South Asian Studies* 30 (2014), 230–44.
- 58 Wu Jing, *The Essentials of Governance*, toim. ja käät. H. De Weerdt, G. Dudbridge ja G. van Beijeren (Cambridge, 2020), VIII, 279–80.
- 59 A. Wright, *The Sui Dynasty: The Unification of China, AD 581–617* (New York, 1978), 48–149; Lewis, *The Earliest Chinese Empires* (Cambridge, 2009).
- 60 L. Beramendi-Orosco et al., "High-resolution chronology for the Mesoamerican urban center of Teotihuacan derived from Bayesian statistics of radiocarbon and archaeological data", *Quaternary Research* 71 (2009), 99–107; D. Carballo ja M. Robb, "Lighting the World: Teotihuacan and Urbanism in Central Mexico", teoksessa M. Robb et al., *Teotihuacan: City of Water, City of Fire* (San Francisco, 2017), 12–19.

- 61 D. Pedrazzi et al., "The Ilopango Tierra Blanca Joven (TBJ) eruption, El Salvador: Volcano-stratigraphy and physical characterization of the major Holocene event of Central America", *Journal of Volcanology and Geothermal Research* 377 (2019), 81–102.
- 62 J. Blomster (toim.), *After Monte Albán: Transformation and Negotiation in Oaxaca, Mexico* (Boulder, CO, 2008); C. Elson, "Su transición de un centro secundario a un cacicazgo en la época Clásica tardía", teoksessa N. Robles García ja A. Riviera Guzmán (toim.), *Memoria de la quinta mesa redonda de Monte Albán* (Mexico City, 2011), 345–74.
- 63 M. Etayo-Cadavid et al., "Marine radiocarbon reservoir age variation in *Donax obesulus* shells from northern Peru: Late Holocene evidence for extended El Niño", *Geology* 41 (2013), 599–602; B. Culleton, "Intrashell Radiocarbon Variability in Marine Mollusks", *Radiocarbon* 48 (2006), 387–400.
- 64 I. Shimada, *Pampa Grande and the Mochica Culture* (Austin, TX, 1994), 122–31.
- 65 Galvez ja Briceño, "The Moche in the Chicama Valley", teoksessa J. Pillsbury (toim.), *Moche Art and Archaeology in Ancient Peru* (Washington, DC, 2001), 141–57.
- 66 T. Dillehay, "Town and Country in Late Moche Times: A View from Two Northern Valleys", teoksessa Pillsbury, *Moche Art*, 259–83; L. Castillo, "Los últimos Mochicas en Jequetepeque", teoksessa S. Uzeda ja E. Mujica (toim.), *Moche: Hacia el final del milenio, 2 vols* (Lima, 2003), 2, 65–123.
- 67 Ks. E. Benson, *The Worlds of the Moche on the North Coast of Peru* (Austin, TX, 2012), 131–2.
- 68 I. Shimada et al., "Cultural impacts of severe droughts in the prehistoric Andes: application of a 1,500-year ice core precipitation record", *World Archaeology* 22 (1991), 247–71.
- 69 C. Robin, "Joseph, dernier roi de Himyar (de 522 à 525, ou une des années suivantes)", *Jerusalem Studies in Arabic and Islam* 34 (2008), 1–124. G. Greatrex, *Rome and Persia at War, 502–532* (Leeds, 1992).
- 70 D. Phillipson, *Foundations of an African Civilisation: Aksum and the Northern Horn, 1000 BC–AD 1300* (Addis Ababa, 2012), 209.
- 71 J. Phillips ja J. Ford, "The Aksumite quarries at Gobedra Hill and Adi Tsehafi", teoksessa D. Phillipson (toim.), *Archaeology at Aksum, Ethiopia, 1993–7* (Lontoo, 2000), 229–46.
- 72 K. Butzer, "Rise and Fall of Axum, Ethiopia: a geo-archaeological interpretation", *American Antiquity* 46 (1981), 471–95; F. Sulas et al., "State formation and water resources management in the Horn of Africa", *World Archaeology* 41 (2009), 2–15.

- 73 Phillipson, *Foundations of an African Civilisation*, 210; D. Phillipson, "Aksum, the entrepot, and highland Ethiopia, 3rd–12th centuries", teoksessa M. Mango, *Byzantine Trade, 4th–12th Centuries: The Archaeology of Local, Regional, and International Exchange* (Farnham, 2009), 353–68.
- 74 Phillipson, *Foundations of an African Civilisation*, 210–12.
- 75 Helama, "Volcanic dust veils", 7–9.
- 76 Prokopios, *Hyper ton polemon*, 2.22–3, teoksessa *History of the Wars, Secret History, Buildings*, toim. ja käant. H. Dewing (Cambridge, MA), I, 450–72.
- 77 M. Meier, "The 'Justinianic Plague': The Economic Consequences of the Pandemic in the Eastern Roman Empire and its Cultural and Religious Effects", *Early Medieval Europe* 24 (2016), 267–92; K. Harper, "Invisible Environmental History: Infectious Disease in Late Antiquity", *Late Antique Archaeology* 12 (2018), 116–31.
- 78 J. Haldon et al., "Lessons from the past, policies for the future: resilience and sustainability in past crises", *Environment Systems and Decisions* 40 (2020), 287–97.
- 79 L. Mordechai et al., "The Justinianic Plague: An inconsequential pandemic?", *PNAS* 116 (2019), 25546–54; L. Mordechai ja M. Eisenberg, "Rejecting Catastrophe: The Case of the Justinianic Plague", *Past & Present* 244 (2019), 3–50.
- 80 C. Wickham, *Framing the Middle Ages: Europe and the Mediterranean, 400–800* (Oxford, 2004), 548; ks. myös J. Banaji, *Agrarian Change in Late Antiquity: Gold, Labour and Aristocratic Dominance* (Oxford, 2001).
- 81 M. Keller et al., "Ancient Yersinia pestis genomes from across Western Europe reveal early diversification during the First Pandemic (541–750)", *PNAS* 116 (2019), 12363–72.
- 82 P. Sarris, "Viewpoint New Approaches to the 'Plague of Justinian'", *Past & Present* 254 (2022), 333.
- 83 G. Bar-Oz et al., "Ancient trash mounds unravel urban collapse a century before the end of Byzantine hegemony in the southern Levant", *PNAS* 116 (2019), 8239–48.
- 84 D. Fuks, "The rise and fall of viticulture in the Late Antique Negev Highlands reconstructed from archaeobotanical and ceramic data", *PNAS* 117 (2020), 1–12; Sarris, 'Climate and Disease', p. 517.
- 85 R. Hoyland, *Arabia and the Arabs from the Bronze Age to the Coming of Islam* (Lontoo, 2001), 231–2; H. Munt, "Arabic and Persian Sources for Pre-Islamic Arabia", teoksessa G. Fisher (toim.), *Arabs and Empires before Islam* (Oxford, 2015), 441–2.

- 86 Y. Park et al., "Ancient familial Mediterranean fever mutations in human pyrin and resistance to *Yersinia pestis*", *Nature Immunology* 21 (2020), 857–67.
- 87 H. Yu et al., "Palaeogenomic analysis of black rat (*Rattus rattus*) reveals multiple European introductions associated with human economic history", *bioRxiv* (2021).
- 88 Seidensticker, "Population collapse in Congo rainforest", 7.
- 89 Keskiaasialaisesta alkuperästä ks. P. de Barros Damgaard et al., "137 ancient human genomes from across the Eurasian steppes", *Nature* 557 (2018), 369–74; M. Keller, C. Paulus ja E. Xoplaki, "Die Justinianische Pest. Grenzen und Chancen naturwissenschaftlicher Ansätze für ein integratives Geschichtsverständnis", *Evangelische Theologie* 81 (2021), 385–400.
- 90 M. Green, "Taking 'pandemic' seriously: Making the Black Death global", teoksessa M. Green (toim.), *Pandemic Disease in the Medieval World: Rethinking the Black Death* (Kalamazoo, MI, 2014), 1–61.
- 91 Sarris, "Climate and Disease", 511–37; H.-S. Lee, "Environment, Epidemic and Power in Early Medieval China – Epidemics and Authority's Strategies in the Northern and Southern Dynasties of Early Medieval China", *Saengtae Whankyeong kwa Yeoksa (Korean Journal of Ecological and Environmental History)* 1 (2015), 82–128.
- 92 H. Pottier, "L'empereur Justinien survivant à la peste bubonique (542)", *Travaux et Mémoires* 16 (2010), 685–91; Harper, *Fate of Rome*, 260.
- 93 M. Morony, "Economic Boundaries? Late Antiquity and Early Islam", *Journal of the Economic and Social History of the Orient* 47 (2004), 166–94.
- 94 D. Stathakopoulos, "Population, Demography, and Disease", teoksessa E. Jeffreys, J. Haldon ja R. Cormack (toim.), *The Oxford Handbook of Byzantine Studies* (Oxford, 2008), 310–12.
- 95 J. Koder, "Climatic Change in Fifth and Sixth Centuries?", teoksessa P. Allen ja E. Jeffreys, *The Sixth Century: End or Beginning* (Sydney, 1996).
- 96 J. Haldon et al., "Lessons from the past, policies for the future: resilience and sustainability in past crises", *Environment Systems and Decisions* 40 (2020), 287–97.
- 97 F. Iversen, "Big bang, lordship or inheritance? Changes in the settlement structure on the threshold of the Merovingian Period, South-Eastern Norway", teoksessa J. Klapste (toim.), *Hierarchies in Rural Settlements* (Turnhout, 2013), 341–58; A. Tvauri, "The impact

- of the climate catastrophe of 536–7 AD in Estonia and neighbouring areas”, *Estonian Journal of Archaeology* 18 (2014), 30–56.
- 98 F. Iversen, ”Estate Division: Social Cohesion in the Aftermath of AD 536–7”, teoksessa F. Iversen ja H. Petersson (toim.), *The Agrarian Life of the North, 2000 BC–AD 1000* (Oslo, 2017), 41–75. Ks. myös D. Löwenborg, ”An Iron Age shock doctrine – did the AD 536–7 event trigger large-scale social changes in the Mälaren valley area?”, *Journal of Archaeology and Ancient History* 4 (2012), 3–29; Büntgen et al., ”Cooling and societal change”, 23–6.
- 99 A. Cameron, ”The Theotokos in Sixth-Century Constantinople: A City Finds its Symbol”, *Journal of Theological Studies* 29 (1978), 79–108; K. Sessa, ”The New Environmental Fall of Rome: A Methodological Consideration”, *Journal of Late Antiquity* 12 (2019), 240–3.
- 100 M. Meier, *Das andere Zeitalter Justinians. Kontingenzerfahrung und Kontingenzbewältigung im 6. Jahrhundert n. Chr* (Göttingen, 2004), 307ff.; M. Meier, ”The ‘Justinianic Plague’”, 284–7.
- 101 Gregorius Toursilainen, *Historia Francorum*, toim. B. Krusch ja W. Levison (Bonn, 1884), 6.46, 286–7; C. Rohr, ”Signa apparuerunt, quae aut regis obitum adnunciare solent aut regiones excidium: Naturerscheinungen und ihre ‘Funktion’ in der *Historia Francorum* Gregors von Tours”, teoksessa D. Groh, M. Kempe ja F. Maelshagen (toim.), *Naturkatastrophen: Beiträge zu ihrer Deutung, Wahrnehmung und Darstellung in Text und Bild von der Antike bis ins 20. Jahrhundert* (Tübingen, 2003), 65–78.
- 102 A. Stoclet, ”*Consilia humana, ops divina, superstitione*: Seeking Succor and Solace in Times of Plague, with Particular Reference to Gaul in the Early Middle Ages”, teoksessa L. Little (toim.), *Plague and the End of Antiquity: The Pandemic of 541–750* (Cambridge, 2012), 137–8.
- 103 K. Høilund Nielsen, ”Endzeiterwartung – expecting the End of the World”, *Neue Studien zur Sachsenforschung* 5 (2015), 23–50.
- 104 K. Sessa, ”The New Environmental Fall of Rome: A Methodological Consideration”, *Journal of Late Antiquity* 12 (2019), 240–3.
- 105 P. Jenkins, *Climate, Catastrophe, and Faith: How Changes in Climate Drive Religious Upheaval* (New York, 2021).
- 106 D. Keys, *Catastrophe: An Investigation into the Origins of the Modern World* (Lontoo, 1999), 182–3; Sarris, ”Climate and Disease”, 531–2.
- 107 *The History of Theophylact Simocatta: An English Translation with Introduction and Notes*, toim. ja käändt. M. Whitby ja M. Whitby (Oxford, 1986), 5.10, 147.

- 108 G. Zanchetta et al., "Beyond one-way determinism: San Frediano's miracle and climate change in Central and Northern Italy in late antiquity", *Climatic Change* 165 (2021), 1–21.

IMPERIUMIEN KULTAKAUSI

- 1 J. Howard-Johnston, *The Last Great War of Antiquity* (Oxford, 2021).
- 2 J. Howard-Johnston, *Witnesses to a World Crisis: Historians and Histories of the Middle East in the Seventh Century* (Oxford, 2010), erityisesti 436–44.
- 3 *Chronicon Pascale 284–628 ad*, käant. M. Whitby ja M. Whitby (Liverpool, 1989), 169–70.
- 4 *The Armenian History attributed to Sebeos*, toim. ja käant. R. Thomson ja J. Howard-Johnston, 2 vols (Liverpool, 2001), 131, 90.
- 5 C. Zuckerman, "La Petite Augusta et le Turc: Epiphania-Eudocie sur les monnaies d'Héraclius", *Revue Numismatique* 150 (1995), 113–26.
- 6 M. Whittow, "Byzantium's Eurasian Policy in the Age of the Türk Empire", teoksessa N. Di Cosmo ja M. Maas (toim.), *Empires and Exchanges in Eurasian Late Antiquity: Rome, China, Iran and the Steppe, ca. 250–750* (Cambridge, 2018), 271–86; J. Howard-Johnston, "The Sasanians' Strategic Dilemma", teoksessa H. Börm ja J. Wiesehöfer (toim.), *Commutatio et contentio: Studies in the Late Roman, Sasanian and Early Islamic Near East in Memory of Zeev Rubin* (Düsseldorf, 2010), 37–70.
- 7 D. Sinor, "The establishment and dissolution of the Türk empire", teoksessa D. Sinor (toim.), *The Cambridge History of Early Inner Asia* (Cambridge, 1990), 285–316.
- 8 R. Payne, "The Silk Road and the Iranian Political Economy in Late Antiquity", *Bulletin of the School of Oriental and African Studies* 81 (2018), 227–50; E. de la Vaissière, *Sogdian Traders* (Leiden, 2005), 209–10.
- 9 K. Rezakhani, *ReOrienting the Sasanians: East Iran in Late Antiquity* (Edinburgh, 2017); Sarris, *Empire of Faith*, 157–8.
- 10 W. Pohl, *Die Awaren: Ein Steppenvolk im Mitteleuropa, 567–822 n. Chr* (Munich, 1988); W. Pohl (toim.), *Von den Hunnen zu den Türken – Reiterkrieger in Europa und Zentralasien* (Berliini, 2021).
- 11 D. Graff, "Strategy and contingency: The Tang defeat of the Eastern Turks", teoksessa N. Di Cosmo (toim.), *Warfare in Inner Asian History* (Leiden, 2002), 33–71.
- 12 J. Skaff, *Sui-Tang China and its Turko-Mongol Neighbours: Culture, Power, and Connections, 580–800* (Oxford, 2012), 58.

- 13 Ibid., 149–50.
- 14 E. de la Vaissière, "Oncles et frères: Les qaghans Ashinas et le vocabulaire turc de la parenté", *Turcica* 42 (2010), 267–78.
- 15 N. Di Cosmo, C. Oppenheimer ja U. Büntgen, "Interplay of environmental and socio-political factors in the downfall of the Eastern Türk Empire in 630 CE", *Climatic Change* 145 (2017), 390.
- 16 Ibid., 383–95; J. Fei, J. Zhou ja Y. Hou, "Circa AD 626 volcanic eruption, climatic cooling, and the collapse of the Eastern Turkic Empire", *Climatic Change* 81 (2007), 469–75.
- 17 Q. Ma, "How Do Multiscale Interactions Affect Extreme Precipitation in Eastern Central Asia?", *Journal of Climate* 34 (2021), 7475–91.
- 18 S. Begzsuren et al., "Livestock responses to droughts and severe winter weather in the Gobi Three Beauty National Park, Mongolia", *Journal of Arid Environment* 59 (2004), 785–96; Di Cosmo, Oppenheimer ja Büntgen, "Interplay of environmental and socio-political factors", 388.
- 19 C. Field et al., *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change* (Cambridge, 2012), 501; Di Cosmo, Oppenheimer ja Büntgen, "Interplay of environmental and socio-political factors", 392.
- 20 J.-Q. Fang ja G. Liu, "Relationship between climatic change and the nomadic southward migrations in eastern Asia during historical times", *Climatic Change* 22 (2012), 151–68.
- 21 Di Cosmo, Oppenheimer ja Büntgen, "Interplay of environmental and socio-political factors", 391–2; Z. Batjargal, *Lessons learnt from the Dzud, 1999–2000*, UNDP (Ulanbaatar, 2000), 41.
- 22 Field et al., *Managing the Risks*, 502; J. Janzen, "Mobile Livestock-Keeping in Mongolia: Present Problems, Spatial Organisation, Interactions between Mobile and Sedentary Population Groups and Perspectives for Pastoral Development", *Geography Research Forum* 25 (2005), 62–82.
- 23 Di Cosmo, Oppenheimer ja Büntgen, "Interplay of environmental and socio-political factors", 390.
- 24 Ibid., 392. Ks. myös Sneath, *Headless State*; N. Di Cosmo, *Ancient China and its Enemies: The Rise of Nomadic Power in East Asian History* (Cambridge, 2004).
- 25 J. Skaff, "Ideological interweaving in Eastern Eurasia: Simultaneous Kingship and Dynastic Competition, 580–755", teoksessa Di Cosmo ja Maas, *Empires and Exchanges*, 386–7.

- 26 E. de la Vaissière, "Ziebel Qaghan Identified", teoksessa C. Zuckerman, *Constructing the Seventh Century: Travaux et Mémoires* 17 (2014), 741–8.
- 27 de la Vaissière, "Oncles et frères", 267–78; Skaff, *Sui-Tang China*, 150–3.
- 28 Ks. Skaff, *Sui-Tang China*, 105ff.
- 29 D. McMullen, "Bureaucrats and Cosmology: The Ritual Code of T'ang China", teoksessa Cannadine ja Price (toim.), *Rituals of Royalty*, 181–236.
- 30 G. Heck, "'Arabia without Spices': An Alternative Hypothesis: The Issue of 'Makkan Trade and the Rise of Islam'", *Journal of the American Oriental Society* 123 (2003), 547–76; J. Schiettecatte ja C. Robin, *L'Arabie à la veille de l'Islam: un bilan clinique* (Pariisi, 2009).
- 31 U. von Freeden, "Das Ende engzelligen Cloisonnés und die Eroberung Südarabiens durch die Sasaniden", *Germania*, 78, 97–122.
- 32 Howard-Johnston, *Witnesses to a World Crisis*, 436–60.
- 33 L. Little, "Life and Afterlife of the First Plague Pandemic", teoksessa Little (toim.), *Plague and the End of Antiquity*, 8.
- 34 *Koraani*, 81–2. Suomentanut Jaakko Hämeen-Anttila, Basam Books 2013.
- 35 T. Macintosh-Smith, *Arabs: A Three Thousand Year History of Peoples, Tribes and Empires* (New Haven, 2019), 340–6.
- 36 R. Nicholson, *A Literary History of the Arabs* (Lontoo, 1998), 418.
- 37 A. Watson, "The Arab agricultural revolution and its diffusion, 700–1100", *Journal of Economic History* 34 (1974), 8–35; A. Watson, *Agricultural Innovation in the Early Islamic World: The Diffusion of Crops and Farming Techniques* (Cambridge, 1983).
- 38 M. Decker, "Plants and progress: rethinking the Islamic agricultural revolution", *Journal of World History* 20 (2009), 187–206.
- 39 D. Fuks, O. Amichay ja E. Weiss, "Innovation or preservation? Abbasid aubergines, archaeobotany, and the Islamic Green Revolution", *Archaeological and Anthropological Sciences* 12 (2020), 1–16.
- 40 Johannes Nikiulainen, *Khronike*, käant. R. Charles, *The Chronicle of John of Nikiu* (Lontoo, 1916), 120.17–28, 193–4.
- 41 A. Gariboldi, "Social conditions in Egypt under the Sasanian Occupation (619–29 AD)", *La Parola del Passato: Rivista di Studi Antichi* 64 (2009), 321–50.
- 42 S. Stark, *Die Alttürkenzeit in Mittel- und Zentralasien: Archäologische und historische Studien* (Wiesbaden, 2008), 287–314.
- 43 R. Bulliet, *Conversion to Islam in the Medieval History: An Essay in Quantitative History* (Cambridge, 1979); R. Bulliet, *Islam: The View from the Edge* (New York, 1994).

- 44 A. Izdebski, *A Rural Economy in Transition: Asia Minor from Late Antiquity into the Early Middle Ages* (Warsaw, 2013).
- 45 M. Jacq-Hergoualc'h, *Malay Peninsula: Crossroads of the Maritime Silk Road* (Leiden, 2002), 233–57.
- 46 O. Wolters, *Fall of Srivijaya* (Ithaca, NY, 1970), 9–10.
- 47 H. Kulke, "'Kadatuan Śrivijaya' – Empire or Kraton of Śrivijaya? A Reassessment of the Epigraphical Evidence", *Bulletin de l'École Française d'Extrême-Orient* 80 (1993), 159–81.
- 48 V. Lieberman, *Strange Parallels: Southeast Asia in Global Context, c.800–1830*, 2 vols (Cambridge, 2010–12). Myös T. Maxwell, *The Gods of Asia: Image, Text and Meaning* (Delhi, 2007).
- 49 R. Hoyland, "Physiognomy in Islam", *Jerusalem Studies in Arabic and Islam* 30 (2005), 361–402; A. Al-Azmeh, "Barbarians in Arab Eyes", *Past & Present* 134 (1992), 3–18; Hippokrates, "Airs, Waters, Places", teoksessa W. Jones (toim. ja käant.), *Ancient Medicine*, 11 vols (Cambridge, 1923–2018), 1, 12–23, 104–32; Aristoteles, *Politics*, 7.6, 564–6.
- 50 D. Phillipson, "Trans-Saharan gold trade and Byzantine coinage", *Antiquaries Journal* 97 (2017), 145–69.
- 51 Ibn Qutayba, *Kitāb al-mā‘arif*, teoksessa J. Hopkins ja N. Levzion (toim.), *Corpus of Early Arabic Sources for West African History* (Cambridge, 1981), 15.
- 52 al-Ya‘qūbī, *Tārīkh*, teoksessa Hopkins ja Levzion (toim.), *Corpus of Early Arabic Sources*, 21.
- 53 P. Hardy, "Medieval Muslim Philosophers on Race", teoksessa J. Ward ja T. Scott (toim.), *Philosophers on Race: Critical Essays* (Oxford, 2002), 38–62; R. Schine, "Conceiving the Pre-Modern Black-Arab hero: On the Gendered Production of Racial Difference in *Sirat al-amirah dhāt al-himmah*", *Journal of Arabic Literature* 48 (2017), 298–326.
- 54 D. Goldenberg, *The Curse of Ham: Race and Slavery in Early Judaism, Christianity, and Islam* (Princeton, 2003).
- 55 al-Ya‘qūbī, *Tārīkh*, 21.
- 56 Al-Mas‘ūdī, *Akhbār al-zamān*, teoksessa Hopkins ja Levzion (toim.), *Corpus of Early Arabic Sources*, 35.
- 57 Al-İştakhrī, *Kitāb Masālik al-mamālik*, ibid., 40.
- 58 Al-Bīrunī, *Kitāb al-jamāhir fī ma‘rifat al-jamāhir*, ibid., 59.
- 59 T. Insoll, "Syncretism, Time and Identity: Islamic Archaeology in West Africa", teoksessa D. Whitcomb (toim.), *Changing Social Identity with the Spread of Islam: Archaeological Perspectives* (Chicago, 2004), 89–101.

- 60 S. Takezawa ja M. Cissé, "Discovery of the Earliest Royal Palace in Gao and its Implications for the History of West Africa", *Cahiers d'Études Africaines* 208 (2012), 813–44.
- 61 M. Gomez, *African Dominion: A New History of Empire in Early and Medieval Africa* (Princeton, 2018), 21–3; D. Lange, "From Mande to Songhay: Towards a Political and Ethnic History of Medieval Gao", *Journal of African History* 35 (1994), 275–301.
- 62 L. Sebastian, *The Chaco Anasazi: Sociopolitical Evolution in the Prehistoric Southwest* (Cambridge, 1992).
- 63 T. Pauketat, *Ancient Cahokia and the Mississippians* (Cambridge, 2004).
- 64 L. Carlson ja W. Keegan, "Resource depletion in the prehistoric northern West Indies", teoksessa S. Fitzpatrick (toim.), *Voyages of Discovery: The Archaeology of Islands* (Westport, CT, 2004), 85–107.
- 65 L. Newsom ja E. Wing, *On Land and Sea: Native American Uses of Biological Resources in the West Indies* (Tuscaloosa, AL, 2004).
- 66 B. Marshak, "The archaeology of Sogdiana", *Silk Road* 1 (2003), 2–8; G. Azarpay, *Sogdian Painting: The Pictorial Epic in Oriental Art* (Berkeley, 1981).
- 67 P. Owczarek et al., "Relationships between loess and the Silk Road reflected by environmental change and its implications for human societies in the area of ancient Panjikent, central Asia", *Quaternary Research* (2017), 1–11.
- 68 J. Safran, *The Second Umayyad Caliphate: The Articulation of Caliphal Legitimacy in al-Andalus* (Cambridge, MA, 2000).
- 69 F. Grenet ja E. de la Vaissière, "The Last Days of Panjikent", *Silk Road Art and Archaeology* 8 (2002), 155–96.
- 70 D. Gutas, *Greek Thought, Arabic Culture: The Graeco-Arabic Translation Movement in Baghdad and Early 'Abbāsid Society (2nd–4th/8th–10th Centuries)* (Lontoo, 1998), 34–52.
- 71 K. van Bladel, "Eighth-Century Indian Astronomy in the Two Cities of Peace", teoksessa B. Sadeghi et al. (toim.), *Islamic Cultures, Islamic Contexts: Essays in Honor of Professor Patricia Crone* (Leiden, 2015), 257–94.
- 72 J. Montgomery, *Al-Jāḥīz: In Praise of Books* (Edinburgh, 2013), 5.
- 73 R. Irwin (toim.), *Night and Horses and the Desert: An Anthology of Classical Arabic Literature* (Lontoo, 2002), 68.
- 74 *Koraani*, 48:5.
- 75 Ibid., 9:2.
- 76 Ibid., 36:56–7.
- 77 Toinen Mooseksen kirja, 16:1–36; Neljäs Mooseksen kirja, 11.1–9.

- 78 Luukas, 5:1–11.
- 79 Matteus, 14:13–21; Markus, 6:31–44; Luukas, 9:12–17; Johannes, 6:1–14.
- 80 S. Tlili, "I Invoke God, Therefore I Am: Creation's Spirituality and its Ecologic Impact in Islamic Texts", teoksessa Parham ja Westling, *Global History of Literature and the Environment*, 107–22.
- 81 I. Özdemir, "Toward an Understanding of Environmental Ethics from a Qur'anic Perspective", teoksessa R. Foltz, M. Denny ja A. Baharuddin (toim.), *Islam and Ecology: A Bestowed Trust* (Cambridge, 2003), 3–38.
- 82 al-Buhturī, *Dīwān al-Buhturī* (Cairo, 1963), 3, 1631.
- 83 G. Dawkes et al., "The form and abandonment of the city of Kuik-Marden, Otrar oasis, Kazakhstan in the Early Islamic period", *Journal of Islamic Archaeology* 6 (2020), 137–52; R. Sala ja J. Deom, "Medieval tortkuls of northern Tianshan and mid-low Syrdarya in the role of Eurasian steppes nomads in the development of world military art", teoksessa N. Masanov (toim.), *Proceedings of the International Conference Almaty 22–23 April 2010, in Commemoration of N. E. Masanov* (Almaty, 2010), 263–86.
- 84 B. Yang et al., "Late Holocene climatic and environmental changes in arid central Asia", *Quaternary International* 194 (2009), 68–78; Q. Pei ja D. Zhang, "Long-term relationship between climate change and nomadic migration in historical China", *Ecology and Society* 19 (2014), 1–17; S. Fowell et al., "Mid- to late Holocene paleoclimate evolution of the Lake Telmen Basin, north central Mongolia, based on palynological data", *Quaternary Research* 59 (2003), 353–63.
- 85 D. Waines, "'Luxury goods' in medieval Islamic societies", *World Archaeology* 34 (2003), 571–80.
- 86 *Annals of the Caliphs' Kitchens: Ibn Sayyār Al-Warrāq's Tenth-Century Baghdad Cookbook*, kään. N. Nasrallah (Leiden, 2007), 29.
- 87 Ibid., 35–6.
- 88 Ibid., 30.
- 89 Al-Thālibī, *Yatīmat al-Dahr*, lainattu teoksessa *Annals of the Caliphs' Kitchens*, 42.
- 90 M. Campopiano, "Fiscalité et structures économiques et sociales en Irak de la conquête arabe à la crise du califat abbasside (VIIe–Xe siècles)", teoksessa S. Gilotte ja E. Voguet (toim.), *Terroirs d'Al-Andalus et du Maghreb VIIIe–XVe siècle: Peuplements, ressources et sainteté* (Pariisi, 2015), 51–77.
- 91 C. Robinson, *Empire and Elites after the Muslim Conquest: The Transformation of Northern Mesopotamia* (Cambridge, 2000), 44–50.

- 92 B. van Bavel, "New Perspectives on Factor Markets and Ancient Middle Eastern Economies: A Survey", *Journal of the Economic and Social History of the Orient* 57 (2014), 145–72.
- 93 W. Toonen et al., "A hydromorphic reevaluation of the forgotten river civilisations of Central Asia", *PNAS* 117 (2020), 32,982–8.
- 94 R. Adams, *Land behind Baghdad: A History of Settlement on the Diyala Plain* (Chicago, 1965), 97–106.
- 95 M. Campopiano, "Cooperation and Private Enterprise in Water Management in Iraq: Continuity and Change between the Sasanian and Early Islamic Periods (Sixth to Tenth Centuries)", *Environment and History* 23 (2017), 385–407.
- 96 A. Popovic, *La Révolte des esclaves in Iraq au IIIe/IXe siècle* (Pariisi, 1976), 13–25.
- 97 B. van Bavel, M. Campopiano ja J. Dijkman, "Factor Markets in Early Islamic Iraq, c. 600–1100 AD", *Journal of the Economic and Social History of the Orient*, 57 (2014), 262–89.
- 98 Campopiano, "Fiscalité", 51–77.
- 99 H. Kennedy, *When Baghdad Ruled the World: The Rise and Fall of Islam's Greatest Dynasty* (Cambridge, MA, 2005), 194.
- 100 M. Canard, "Baghdad au IVe siècle de l'Hégire (Xe siècle de l'ère chrétienne)", *Arabica* 9 (1962), 267–87.
- 101 Bar Hebraeus, *Ktābā d-maktbānūt zabnē*, toim. ja käant. E. Budge, *The Chronography of Gregory Abul Faraj*, 2 vols (Oxford, 1932), I, 164.
- 102 Matteus Edessalainen, *Armenia and the Crusades, Tenth to Twelfth Centuries: The Chronicle of Matthew of Edessa* (Lanham, MD, 1993), I, 19.
- 103 R. Ellenblum, *The Collapse of the Eastern Mediterranean: Climate Change and the Decline of the East, 950–1072* (Cambridge, 2012); X. Wang, "Climate, Desertification, and the Rise and Collapse of China's Historical Dynasties", *Human Ecology* 38 (2010), 157–72.
- 104 S. Raphael, *Climate and Political Climate: Environmental Disasters in the Medieval Levant* (Leiden, 2013), 60.
- 105 A. Allouche, *Mamluk Economics: A Study and Translation of al-Maqrīzī's Ighāthah* (Salt Lake City, UT, 1994), 33.
- 106 Campopiano, "Cooperation and Private Enterprise", 385–407.
- 107 Brooke, *Climate Change*, 358. Ilmaston tekijänä Tang-dynastian kaatumisessa ks. esim. P. Zheng et al., "A Test of Climate, Sun, and Culture Relationships from an 1810-Year Chinese Cave Record", *Science* 322 (2008), 940–2; H. Cheng, R. Edwards ja G. Haug, "Simulated warm periods of climate over China during the last two millennia: The

- Sui-Tang warm period versus the Song-Yuan warm period”, *JGR Atmospheres* 120 (2015), 2229–41.
- 108 D. Johnson, ”The Last Years of a Great Clan: The Li Family of Chao Chün in Late T’ang and Early Sung”, *Harvard Journal of Asiatic Studies* 37 (1977), 5–102.
- 109 N. Tackett, *The Destruction of the Medieval Chinese Aristocracy* (Cambridge, MA, 2014).
- 110 Ibid., 188.
- 111 P. Lorge, ”Introduction”, teoksessa P. Lorge (toim.), *Five Dynasties and Ten Kingdoms* (Hong Kong, 2011), 5–7.
- 112 R. Gill et al., ”Drought and the Maya collapse”, *Ancient Mesoamerica* 18 (2007), 283–302.
- 113 S. Thompson et al. (toim.), *Mayan Folktales. Cuentos folklóricos mayas* (Westport, CT, 2007), xxv.
- 114 G. Jones, *The Conquest of the Last Maya Kingdom* (Stanford, 1998).
- 115 P. Harrison, *The Lords of Tikal: Rulers of an Ancient Maya City* (Lontoo, 1999).
- 116 M. Golitko et al., ”Complexities of collapse: the evidence of Maya obsidian as revealed by social network graphical analysis”, *Antiquity* 86 (2012), 507–23.
- 117 M. Golitko ja G. Feinman, ”Procurement and Distribution of Pre-Hispanic Mesoamerican Obsidian 900 BC–AD 1250: A Social Network Analysis”, *Journal of Archaeological Method and Theory* 22 (2015), 206–47.
- 118 S. Houston et al., ”A Teotihuacan complex at the Classic Maya city of Tikal, Guatemala”, *Antiquity* 95 (2021), 1–9.
- 119 A. Thompson, G. Feinman ja K. Prufer, ”Assessing Classic Maya multi-scalar household inequality in southern Belize”, *Plos ONE* 16 (2021), 1–30.
- 120 K. Tsukamoto ja O. Olguín, ”Ajpac’ Waal: The hieroglyphic stairway at the Guzmán Group of El Palmar, Campeche, Mexico”, teoksessa C. Golden, S. Houston ja J. Skidmore (toim.), *Maya Archaeology* (San Francisco, 2015), 30–55; O. Esparza Olguín ja K. Tsukamoto, ”Espacios de la escenografía ritual”, teoksessa A. Velasco Martínez ja M. Vega (toim.), *Los Mayas: Voces de piedra* (Mexico City, 2011), 393–9.
- 121 V. Tiesler, A. Cucina, ja M. Ramírez-Salomon, ”Permanent Dental Modifications among the Ancient Maya: Procedures, Health Risks, and Social Identities”, teoksessa S. Burnett ja J. Irish (toim.), *A World View of Bioculturally Modified Teeth* (Gainesville, FL, 2017), 270–84.

- 122 J. Cerezo-Román ja K. Tsukamoto, "The Life Course of a Standard-Bearer: A Nonroyal Elite Burial at the Maya Archaeological Site of El Palmar, Mexico", *Latin American Antiquity* 32 (2021), 274–91.
- 123 M. Canuto et al., "Ancient lowland Maya complexity as revealed by airborne laser scanning of northern Guatemala", *Science* 361 (2018), 1–17.
- 124 P. Harrison, *The Lords of Tikal: Rulers of an Ancient Maya City* (Lontoo, 1999).
- 125 S. Martin, "In the line of the founder: a view of dynastic politics at Tikal", teoksessa J. Sabloff (toim.), *Tikal: Dynasties, Foreigners, and Affairs of State – Advancing Maya Archaeology* (Santa Fe, NM, 2003), 3–45.
- 126 T. Culbert et al., "The population of Tikal, Guatemala", teoksessa T. Culbert ja D. Rice (toim.), *Precolumbian Population History in the Maya Lowlands* (Albuquerque, 1990), 103–21.
- 127 V. Scarborough et al., "Water and sustainable land use at the ancient tropical city of Tikal, Guatemala", *PNAS* 109 (2012), 12,408–13.
- 128 D. Lentz et al., "Imperial resource management at the ancient Maya city of Tikal: A resilience model of sustainability and collapse", *Journal of Anthropological Archaeology* 52 (2018), 113–22.
- 129 D. Lentz et al., "Forests, Fields, and the Edge of Sustainability at the Ancient Maya City of Tikal", *PNAS* 111 (2014), 18,513–18.
- 130 D. Kennett et al., "Development and Disintegration of Maya Political Systems in Response to Climate Change", *Science* 338 (2012), 788–91; D. Hodell, J. Curtis ja M. Brenner, "Terminal Classic drought in the northern Maya lowlands inferred from multiple sediment cores in Lake Chichancanab (Mexico)", *Quaternary Science Reviews* 24 (2005), 1413–27; G. Haug et al., "Climate and the collapse of Maya civilisation", *Science* 299 (2003), 1731–5.
- 131 N. Evans et al., "Quantification of drought during the collapse of the classic Maya civilisation", *Science* 361 (2018), 498–501; N. Hodell et al., "Solar forcing of drought frequency in the Maya lowlands", *Science* 292 (2001), 1367–70.
- 132 B. Turner ja J. Sabloff, "Classic Period collapse of the Central Maya Lowlands: Insights about human-environment relationships for sustainability", *PNAS* 109 (2012), 13,908–14.
- 133 B. Cook et al., "Pre-Columbian deforestation as an amplifier of drought in Mesoamerica", *Geophysical Research Letters* 39 (2012), 1–5.
- 134 S. Fedick ja L. Santiago, "Large variation in availability of Maya food plant sources during ancient droughts", *PNAS* 119 (2021), 1–7.

- 135 D. Lobell et al., "Nonlinear heat effects on African maize as evidenced by historical yield trials", *Nature Climate Change* 1 (2011), 42–5.
- 136 W. Carleton, D. Campbell ja M. Collard, "Increasing temperatures exacerbated Classic Maya conflict over the long term", *Quaternary Science Reviews* 163 (2017), 209–18.
- 137 C. Ting, "Continuity and change in fine-ware production in the eastern Maya lowlands during the Classic to Postclassic transition (AD 800–1250)", *Archaeological and Anthropological Sciences* 10 (2018), 1913–31.
- 138 H. Haines, P. Willink ja D. Maxwell, "Stingray Spine Use and Maya Bloodletting Rituals: A Cautionary Tale", *Latin American Antiquity* 19 (2008), 83–98.
- 139 G. Feinman ja L. Nicholas, "After Monte Albán in the Central Valleys of Oaxaca: A Reassessment", teoksessa R. Faulseit (toim.), *Beyond Collapse: Archaeological Perspectives on Resilience, Revitalization, and the Transformation in Complex Societies* (Carbondale, IL, 2016), 43–69.
- 140 D. Lentz et al., "Molecular genetic and geochemical assays reveal severe contamination of drinking water reservoirs at the ancient Maya city of Tikal", *Scientific Reports* 10 (2020), 1–9.
- 141 R. Markens, M. Winter ja C. Martínez López, "Ethnohistory, Oral History, and Archaeology at Macuilxochitl: Perspectives on the Postclassic Period (800–1521 CE) in the Valley of Oaxaca", teoksessa J. Blomster (toim.), *After Monte Albán: Transformation and Negotiation in Oaxaca, Mexico* (Boulder, CO, 2008), 193–215.
- 142 J. Aimérs, "What Maya collapse? Terminal Classic variation in the Maya lowlands", *Journal of Archaeological Research* 15 (2007), 329–77; A. Demarest, P. Rice ja D. Rice, "The Terminal Classic in the Maya Lowlands: Assessing collapses, terminations, and transformations", teoksessa A. Demarest, P. Rice ja D. Rice (toim.), *The Terminal Classic in the Maya Lowlands: Collapse, Transition, and Transformation* (Boulder, CO, 2004), 545–72.
- 143 L. Lucero, J. Gunn ja V. Scarborough, "Climate change and Classic Maya water management", *Water* 3 (2011), 479–94.
- 144 Lentz et al., "Imperial resource management", 119.

KESKIAJAN LÄMMIN KAUSI

- 1 H. Lamb, "The Early Medieval Warm Epoch and its Sequel", *Palaeogeography, Palaeoclimatology, Palaeoecology* 1 (1965), 13–37.

- 2 T. Wozniak, *Naturereignisse im frühen Mittelalter. Das Zeugnis der Geschichtsschreibung vom 6. bis 11. Jahrhundert* (Berliini, 2020); H. Wanner, *Klima und Mensch. Eine 12000-jährige Geschichte* (Bern, 2016).
- 3 R. Hoffmann, *An Environmental History of Medieval Europe* (Cambridge, 2014).
- 4 C. Rohr, C. Camenisch ja K. Pribyl, "European Middle Ages", teoksessa White, Pfister ja Mauelshagen (toim.), *Palgrave Handbook of Climate History*, 247–63.
- 5 J. Preiser-Kapeller, "A collapse of the Eastern Mediterranean?", *Jahrbuch der Österreichischen Byzantinistik* 65 (2015), 201.
- 6 A. Izdebski, T. Słoczyński ja G. Koloch, "Exploring Byzantine and Ottoman economic history with the use of palynological data: a quantitative approach", *Jahrbuch der Österreichischen Byzantinistik* 65 (2015), 67–110.
- 7 Cook, "Megadroughts, ENSO, and the Invasion of Late-Roman Europe", 89–92.
- 8 D. Zhang, "Evidence for the existence of the Medieval Warm Period in China", *Climatic Change* 24 (1994), 289–97.
- 9 Y. Zhang et al., "'Medieval Warm Period': on the northern slope of central Tianshan Mountains, Xinjiang, NW China", *Geophysical Research Letters*, 36 (2009), 1–5.
- 10 F. Wang et al., "Northern Hemisphere millennial temperature variability", *Nature Communications* 13 (2022), 1–10.
- 11 V. Trouet et al., "Persistent positive North Atlantic oscillation mode dominated the medieval climate anomaly", *Science* 324 (2009), 78–80; J. Chen et al., "Hydroclimatic changes in China and surroundings during the Medieval Climate Anomaly and Little Ice Age: spatial patterns and possible mechanisms", *Quaternary Science Reviews* 107 (2015), 98–111.
- 12 M. Mann et al., "Global Signatures and Dynamical Origins of the Little Ice Age and Medieval Climate Anomaly", *Science* 326 (2009), 1256–60; H. Diaz et al., "Spatial and Temporal Characteristics of Climate in Medieval Times Revisited", *Bulletin of the American Meteorological Society* 92 (2011), 1487–1500.
- 13 J. Vaquero ja R. Trigo, "A Note on Solar Cycle Length during the Medieval Climate Anomaly", *Solar Physics* 279 (2012), 289–94.
- 14 N. Graham et al., "Support for global climate reorganization during the 'Medieval Climate Anomaly'", *Climate Dynamics* 37 (2011), 2017–45.
- 15 F. Malamud-Roam et al., "Holocene paleoclimate records from a large California estuarine system and its watershed region: linking watershed climate and bay conditions", *Quaternary Science Reviews* 25 (2006),

- 1570–98; I. Shimada, "The Late Prehistoric Coastal States", teoksessa L. Minelli (toim.), *The Inca World: The Development of Pre-Columbian Peru, AD 1000–1534* (Norman, OK, 2000), 49–110.
- 16 S. Stine, "Extreme and persistent drought in California and Patagonia during mediaeval time", *Nature* 369 (1994), 546–9; D. Meko et al., "Medieval drought in the upper Colorado River Basin", *Geophysical Research Letters* 34 (2007), 1–5; H. Mackay, "Spatial variation of hydroclimate in north-eastern North America during the last millennium", *Quaternary Science Reviews* 256 (2021), 1019.
- 17 S. Lüning et al., "Hydroclimate in Africa during the Medieval Climate Anomaly", *Palaeography, Palaeoclimatology, Palaeoecology* 495 (2018), 309–22.
- 18 S. Lüning, M. Gałka ja F. Vahrenholt, "Warming and Cooling: The Medieval Climate Anomaly in Africa and Arabia", *Paleoceanography* 32 (2017), 1219–35.
- 19 C. Wickham, *Framing the Early Middle Ages: Europe and the Mediterranean, 400–800* (Oxford, 2005).
- 20 Wickham, *Inheritance of Rome*, 229–230.
- 21 Ks. yleisesti M. McCormick, *Origins of the European Economy: Communications and Commerce, AD 300–900* (Cambridge, 2001); J. Zanden, *The Long Road to the Industrial Revolution: The European Economy in a Global Perspective, 1000–1800* (Leiden, 2009), 1–91.
- 22 S. Reynolds, *Kingdoms and Communities in Western Europe, 900–1300* (Oxford, 1984); S. Reynolds, *Fiefs and Vassals: The Medieval Evidence Reinterpreted* (Oxford, 1994); C. West, *Reframing the Feudal Revolution: Political and Social Transformation between Marne and Moselle, c.800–c.1100* (Cambridge, 2013).
- 23 West, *Reframing the Feudal Revolution*.
- 24 P. Brown, *Through the Eye of a Needle: Wealth, the Fall of Rome, and the Making of Christianity in the West, 350–550 AD* (Princeton, 2012).
- 25 A. Verhulst ja G. Bublot, *L'Agriculture en Belgique – hier et aujourd'hui* (Brussels, 1980), 7.
- 26 G. Duby, *L'Économie rurale et la vie des campagnes dans l'Occident médiéval* (Pariisi, 1962), 160–4; L. White, *Medieval Technology and Social Change* (Oxford, 1962).
- 27 S. Milesor ja S. Brookes, *Peasant Perceptions of Landscape: Ewelme Hundred, South Oxfordshire, 500–1650* (Oxford, 2022).
- 28 T. Andersen, P. Jensen ja C. Skovsgaard, "The Heavy Plough and the Agricultural Revolution in Medieval Europe", EHES Working Paper

- 70 (2014), 1–44; D. Acemoglu, S. Johnson ja J. Robinson, "Institutions as a Fundamental Cause of Economic Growth", teoksessa P. Aghion ja S. Durlauf (toim.), *Handbook of Economic Growth* (Amsterdam, 2005), 386–472.
- 29 M. Rubin, *Cities of Strangers: Making Lives in Medieval Europe* (Cambridge, 2020).
- 30 T. Whited et al., *Northern Europe: An Environmental History* (Denver, CO, 2005), 45–72; A. Demandt, *Der Baum: Eine Kulturgeschichte* (Cologne, 2014).
- 31 C. Goodson, *Cultivating the City in Early Medieval Italy* (Cambridge, 2021), 1.
- 32 Schamiloglu, "Climate Change in Central Eurasia", 12–14.
- 33 Ibn Faḍlān, *Book of Ahmad ibn Faḍlān*, in *Ibn Fadlan and the Land of Darkness: Arab Travellers in the Far North*, käännt. P. Lunde ja C. Stone (Lontoo, 2011), 12.
- 34 P. Raposeiro, "Climate change facilitated the early colonization of the Azores Archipelago during medieval times", *PNAS* 118 (2021), 1–7.
- 35 A. Dugmore, C. Keller ja T. McGovern, "Norse Greenland settlement: reflections on climate change, trade, and the contrasting fates of human settlements in the North Atlantic islands", *Arctic Anthropology* 44 (2007), 12–36; B. Campbell, *The Great Transition: Climate, Disease and Society in the Late-Medieval World* (Cambridge, 2016), 34–8.
- 36 K. Smith, G. Ólafsson ja A. Pálssdóttir, "Ritual responses to catastrophic volcanism in Viking Age Iceland: Reconsidering Surtshellir Cave through Bayesian analyses of AMS dates, tephrochronology, and texts", *Journal of Archaeological Science* 126 (2021), 1–19.
- 37 T. Thordarson et al., "New estimates of sulfur degassing and atmospheric mass-loading by the 934a.d. Eldgjá eruption, Iceland", *Journal of Volcanology and Geothermal Research* 108 (2001), 33–54.
- 38 S. Goodacre, "Genetic evidence for a family-based Scandinavian settlement of Shetland and Orkney during the Viking periods", *Heredity* 95 (2005) 129–35; S. Ebenesersdóttir, "Ancient genomes from Iceland reveal the making of a human population", *Science* 360 (2018), 1028–32.
- 39 B. Wallace, "The Norse in Newfoundland: L'Anse aux Meadows and Vinland", *Newfoundland and Labrador Studies* 19 (2003), 5–43.
- 40 M. Kuitens, "Evidence for European presence in the Americas in AD 1021", *Nature* (2021), 1–13; P. Ledger, L. Girdland-Flink ja V. Forbes, "New horizons and L'Anse aux Meadows", *PNAS* 116 (2019), 15,341–3.
- 41 B. Einarsson, *Skálar og rúst á Stöð í Stöðvarfirði Stöð* (Reykjavik, 2019).
- 42 Dugmore, Keller ja McGovern, "Norse Greenland settlement", 14–16.

- 43 S. Sindbæk, "Urbanism and exchange in the North Atlantic/Baltic, 600–1000 CE", teoksessa T. Hodos (toim.), *The Routledge Handbook of Archaeology and Globalisation* (Lontoo, 2017), 553–65; Frankopan, *Silk Roads*, 102–35.
- 44 R. Kovalev, "The Infrastructure of the Northern Part of the 'Fur Road' between the Middle Volga and the East during the Middle Ages", *Archivum Eurasiae Medii Aevi* 10 (2001), 25–64.
- 45 S. Socin et al., "High-resolution dietary reconstruction of victims of the 79 CE Vesuvius eruption at Herculaneum by compound-specific isotope analysis", *Science Advances* 7 (2021), 1–9; L. Maravall Buckwalter ja J. Baten, "Valkyries: Was gender equality high in the Scandinavian periphery since Viking times? Evidence from enamel hypoplasia and height ratios", *Economics and Human Biology* 34 (2019), 181–93.
- 46 M. Church et al., "Timing and mechanisms of deforestation of the settlement period in Eyjafjallsveit, southern Iceland", *Radiocarbon* 49 (2007), 659–72.
- 47 X. Keighley et al., "Disappearance of Icelandic Walruses Coincided with Norse Settlement", *Molecular Biology and Evolution* 36 (2019), 2656–67.
- 48 T. McGovern et al., "Landscapes of settlement in northern Iceland: Historical ecology of human impact and climate fluctuation on the millennial scale", *American Anthropologist* 109 (2007), 27–51.
- 49 J. Arnebord, N. Lynnerup ja J. Heinemeier, "Human Diet and Subsistence Patterns in Norse Greenland AD c.980–AD c.1450: Archaeological Interpretations", *Journal of the North Atlantic* 3 (2012), 119–33.
- 50 P. Kirch, "The impact of the prehistoric Polynesians on the Hawaiian ecosystem", *Pacific Science* 36 (1982), 1–14.
- 51 P. Kirch, "Hawaii as a Model System for Human Ecodynamics", *American Anthropologist* 109 (2007), 8–26.
- 52 I. Goodwin, S. Browning ja A. Anderson, "Climate windows for Polynesian voyaging to New Zealand and Easter Island", *PNAS* 111 (2014), 14,716–21; P. Kirch, *On the Road of the Winds: An Archaeological History of the Pacific Islands before European Contact* (Berkeley, 2017), 191–208.
- 53 J. Flexner, *Oceania, 800–1800 CE* (Cambridge, 2021), 11–12.
- 54 P. Kirch (toim.), *Tangatatau Rockshelter: The Evolution of an Eastern Polynesian Socio-Ecosystem* (Los Angeles, 2017).
- 55 D. Sear et al., "Human settlement of East Polynesia earlier, incremental, and coincident with prolonged South Pacific drought", *PNAS* 117 (2021), 8813–19.

- 56 P. Nunn ja J. Britton, "Human–Environment Relationships in the Pacific Islands around AD 1300", *Environment and History* 7 (2001), 6–8.
- 57 P. Nunn, "Nature–society interactions in the Pacific Islands", *Human Geography* 85 (2003), 219–29.
- 58 S. Lüning et al., "The Medieval Climate Anomaly in Oceania", *Environmental Reviews* 28 (2020), 45–54.
- 59 M. Smith et al., "Human-environment interactions in Australian drylands: exploratory time-series analysis of archaeological records", *The Holocene* 18 (2008), 389–401; I. Davidson, "Prehistoric Australian demography", teoksessa B. Meehan ja N White (toim.), *Hunter-Gatherer Demography: Past and Present* (Sydney, 1990), 41–58.
- 60 P. Veth, "Cycles of aridity and human mobility: risk minimisation among Late Pleistocene foragers of the Western Desert, Australia", teoksessa P. Veth, M. Smith ja P. Hiscock (toim.), *Desert Peoples: Archaeological Melbourne* (2005), 100–15.
- 61 A. Williams et al., "Hunter-gatherer response to late Holocene climatic variability in northern and central Australia", *Journal of Quaternary Science* 25 (2010), 831–8.
- 62 M. Smith ja J. Ross, "What happened at 1500–1000 cal. BP in central Australia? Timing, impact and archaeological signatures", *The Holocene* 18 (2008), 379–88.
- 63 T. Cohen et al., "A pluvial episode identified in arid Australia during the Medieval Climatic Anomaly", *Quaternary Science Reviews* 56 (2012), 167–71.
- 64 S. Scudder, "Evidence of Sea Level Rise at the Early Ostionan Coralie Site (GT-3), c. AD 700, Grand Turk, Turks and Caicos Islands", *Journal of Archaeological Science* 28 (2001), 1221–33.
- 65 I. Rouse, *The Tainos: Rise and Decline of the People Who Greeted Columbus* (New Haven, 1992); W. Keegan, "Islands of Chaos", teoksessa A. Delpuech ja C. Hofman (toim.), *Late Ceramic Age Societies in the Eastern Caribbean* (Oxford, 1994), 33–44; H. Petitjean Roget, "Contribution à l'Étude du Troumassoïde et du Suazoïde (600–1200 AD). Une hypothèse sur les causes de la régression du Saladoïde aux Petites Antilles", teoksessa L. Alofs ja R. Dijkhoff (toim.), *Proceedings of the 19th International Congress for Caribbean Archaeology* (Aruba, 2001), 227–38.
- 66 S. Fitzpatrick ja W. Keegan, "Human impacts and adaptations in the Caribbean Islands: An historical ecology approach", *Earth and Environmental Science Transactions of the Royal Society of Edinburgh* 98 (2007), 29–45.

- 67 R. Hall, "Exploring the Mississippian Big Bang at Cahokia", teoksessa J. Quilter ja M. Miller (toim.), *A Pre-Columbian World* (Washington, DC, 2006), 187–229; C. Antoniuk, "Cahokia's influence in the Yazoo Basin: a ceramic analysis of Early Mississippian features at the Carson site", *Southeastern Archaeology* 40 (2021), 116–34.
- 68 L. Benson, T. Pauketat ja E. Cook, "Cahokia's Boom and Bust in the Context of Climate Change", *American Antiquity* 74 (2009), 467–83.
- 69 D. McLean, "Identification of the Changbaishan 'Millennium' (B-Tm) eruption deposit in the Lake Suigetsu (SGo6) sedimentary archive, Japan: Synchronisation of hemispheric-wide palaeoclimate archives", *Quaternary Science Reviews* 150 (2016), 301–7; S. Guillet et al., "Climatic and societal impacts of a 'forgotten' cluster of volcanic eruptions in 1108–1110 CE", *Scientific Reports* 10 (2020), 1–10.
- 70 L. Zhang, *The River, The Plain, and the State: An Environmental Drama in Northern Song China, 1048–1128* (Cambridge, 2016), 1–19.
- 71 R. Bocinsky, "Exploration and exploitation in the macrohistory of the pre-Hispanic Pueblo Southwest", *Science Advances* 2 (2016), 1–11; J. Coltrain ja J. Janetski, "The stable and radio-isotope chemistry of southeastern Utah Basketmaker II burials: Dietary analysis using the linear mixing model SISUS, age and sex patterning, geolocation and temporal patterning", *Journal of Archaeological Science* 40 (2013), 4711–30.
- 72 S. Ortman, "Uniform Probability Density Analysis and Population History in the Northern Rio Grande", *Journal of Archaeological Method and Theory* 23 (2016), 95–126.
- 73 K. Roler Durand, "Function of Chaco-Era Great Houses", *Kiva* 69 (2003), 141–69; T. Windes, "This Old House: Construction and Abandonment at Pueblo Bonito", teoksessa J. Neitzel (toim.), *Pueblo Bonito: Center of the Chacoan World* (Washington, DC, 2003), 14–32.
- 74 A. Watson et al., "Early procurement of scarlet macaws and the emergence of social complexity in Chaco Canyon, NM", *PNAS* 112 (2015), 8238–43.
- 75 R. Reina ja M. Kensinger, *The Gift of Birds: Featherworking of Native South American Peoples* (Philadelphia, 1991); H. King, *Peruvian Featherworks: Art of the Precolumbian Era* (New York, 2012); B. Malinowski, *Magic, Science and Religion and Other Essays* (Prospect Height, IL, 1948).
- 76 A. Chepstow-Lusty et al., "Tracing 4,000 Years of Environmental History in the Cuzco Area, Peru, from the Pollen Record", *Mountain Research and Development* 18 (1998), 159–72; A. Chepstow-Lusty ja M. Winfield, "Inca agroforestry: Lessons from the past", *Ambio* 29 (2000),

- 322–8; K. Lane, "Engineered highlands: the social organization of water in the ancient north-central Andes (AD 1000–1480)", *World Archaeology* 41 (2009), 169–90.
- 77 P. Williams ja D. Nash, "Imperial Interaction in the Andes: Huari and Tiwanaku at Cerro Baúl", teoksessa W. Isbell ja H. Silverman (toim.), *Andean Archaeology I* (New York, 2002), 243–65.
- 78 P. Williams, "Rethinking Disaster-Induced Collapse in the Demise of the Andean Highland States: Wari and Tiwanaku", *World Archaeology* 33 (2002), 361–74.
- 79 B. Owen, "Distant Colonies and Explosive Collapse: The Two Stages of the Tiwanaku Diaspora in the Osmore Drainage", *Latin American Antiquity* 16 (2005), 45–80; myös A. Kolata ja C. Ortloff, "Climate and collapse: agro-ecological perspectives on the drought of the Tiwanku State", *Journal of Archaeological Science* 20 (1993), 195–221.
- 80 G. Huckleberry, A. Caramanica ja J. Quilter, "Dating the Ascope Canal System: Competition for Water during the Late Intermediate Period in the Chicama Valley, North Coast of Peru", *Journal of Field Archaeology* 43 (2018), 17–30.
- 81 L. Thompson et al., "Late Glacial Stage and Holocene tropical ice core records from Huascarán, Peru", *Science* 269 (1995), 46–50.
- 82 M. Bush, N. Mosblech ja W. Church, "Climate change and the agricultural history of a mid-elevation Andean montane forest", *The Holocene* 25 (2015), 1522–32.
- 83 W. Church ja A. von Hagen, "Chachapoyas: Cultural development at an Andean cloud forest crossroads", teoksessa Silverman ja Isbell (toim.), *Handbook of South American Archaeology*, 903–26; W. Isbell, "Wari and Tiwanaku: International identities in the central Andean Middle Horizon", teoksessa Silverman ja Isbell (toim.), *Handbook of South American Archaeology*, 731–59; M. Biwer et al., "Hallucinogens, alcohol and shifting leadership strategies in the ancient Peruvian Andes", *Antiquity* 96 (2022), 142–58.
- 84 V. Azevedo, "Medieval climate Variability in the eastern Amazon-Cerrado regions and its archeological implications", *Scientific Reports* 9 (2019), 1–9.
- 85 A. Toso et al., "Fishing intensification as response to Late Holocene socio-ecological instability in southeastern South America", *Scientific Reports* 11 (2021), 1–14. Ks. myös S. Lüning et al., "The Medieval Climate Anomaly in South America", *Quaternary International* 508 (2019), 70–87.

- 86 T. Nagaoka et al., "Paleodemography of a medieval population in Japan: analysis of human skeletal remains from the Yuigahama-minami site", *American Journal of Physical Anthropology* 131 (2006), 1–14.
- 87 T. Nagaoka et al., "A health crisis during the Japanese Medieval Period: A new paleodemographic perspective", *International Journal of Paleopathology* 26 (2019), 145–56.
- 88 V. Lieberman ja B. Buckley, "The Impact of Climate Change on Southeast Asia, circa 950–1820: New Findings", *Modern Asian Studies* 46 (2012), 1063.
- 89 M. Green ja L. Jones, "The Evolution and Spread of Major Human Diseases in the Indian Ocean World", teoksessa G. Campbell ja E.-M. Knoll (toim.), *Disease Dispersion and Impact in the Indian Ocean World* (Basingstoke, 2020), 39; R. Nicholas, "The Goddess Śītalā and Epidemic Smallpox in Bengal", *Journal of Asian Studies* 41 (1981), 21–44.
- 90 Green "Climate and Disease in Medieval Eurasia".
- 91 A. Winterbottom ja F. Tesfaye (toim.), *Histories of Medicine and Healing in the Indian Ocean World*, 2 vols (Basingstoke, 2016).
- 92 C. Ferrier, "Sri Lanka and North India during the Gupta Period: Facts and fancy", *Indian Economic and Social History Review* 55 (2018), 249–81.
- 93 M. Smith, "Indianization from the Indian Point of View: Trade and Cultural Contacts with Southeast Asia in the Early First Millennium c.e.", *Journal of the Economic and Social History of the Orient* 42 (1999), 1–26; C. Cereti, "The Pahlavi Signatures on the Quilon Copper Plates (*Tabula Quilonensis*)", teoksessa W. Sundermann, A. Hintze ja F. de Blois (toim.), *Exegisti monumenta: Festschrift in Honour of Nicholas Sims-Williams* (Wiesbaden, 2009), 31–50.
- 94 Campbell, *Great Transition*, 41–3.
- 95 A. Pokharia et al., "Variable monsoons and human adaptations: Archaeological and palaeoenvironmental records during the last 1400 years in north-western India", *The Holocene* 30 (2020), 1332–44; V. Lieberman, *Strange Parallels: Southeast Asia in Global Context, c. 800–1830*, 2 vols (Cambridge 2003–9), 2, 77–92.
- 96 Lieberman ja Buckley, "Impact of Climate Change on Southeast Asia", 1065.
- 97 M. Bryson, *Goddess on the Frontier: Religion, Ethnicity, and Gender in Southwest China* (Stanford, 2016).
- 98 Ks. R. von Glahn, *An Economic History of China: From Antiquity to the Nineteenth Century* (Cambridge, 2016); J. Chafee, "Sung education: Schools, academies, and examinations", teoksessa J. Chafee ja D. Twitchett (toim.), *The Cambridge History of China: Sung China*,

- 960–1279 AD, 5.2 (Cambridge, 2015), 286–320; W. Liu, "The making of a fiscal state in Song China, 960–1279", *Economic History Review* 68 (2015), 48–78.
- 99 Song-dynastiasta R. von Glahn, "Revisiting the Song monetary revolution: A review essay", *International Journal of Asian Studies* 1 (2004), 159–78.
- 100 G. Wade, "An Early Age of Commerce in Southeast Asia, 900–1300 CE", *Journal of Southeast Asian Studies* 40 (2009), 232.
- 101 M. Pirazzoli-t'Serstevens, "Une Denrée recherchée: La céramique chinoise importée dans le golfe arabo-persique, IXe–XIVe siècles", *Mirabilia Asiatica* 2 (2005), 77.
- 102 Wink, *Al-Hind*, 1, 354.
- 103 Fisher, *Environmental History of India*, 75–6.
- 104 A. Kanisetti, *Lords of the Deccan: Southern India from the Chalukyas to the Cholas* (Delhi, 2022), 247ff.
- 105 S. Chemburkar, "Dancing architecture at Angkor: 'Halls with dancers' in Jayavarman VII's temples", *Journal of Southeast Asian Studies* 46 (2015), 518.
- 106 T. Sen, *Buddhism, Diplomacy and Trade: The Realignment of Sino-Indian Relations, 600–1400* (Honolulu, 2003), 156–8
- 107 J. Miksic ja G. Yian Goh, *Ancient South East Asia* (Abingdon, 2017), 397–8.
- 108 S. Balasubrahmanyam et al., *Later Chola Temples: Kulottunga I to Rajendra III (AD 1070–1280)* (Chennai, 1979); R. Champakalakshmi, "The Study of Settlement Patterns in the Cola Periods: Some Perspectives", *Man and Environment* 14 (1989), 91–101.
- 109 R. Nagaswamy, "Archaeological finds in South India: Esālam bronzes and copper-plates", *Bulletin de l'École Française d'Extrême Orient* 76 (1987), 1–68; D. Ali, "Royal Eulogy as World History: Rethinking Copper-plate Inscriptions in Cōla India", teoksessa R. Inden, J. Walters ja D. Ali (toim.), *Querying the Medieval: Texts and the History of Practices in South Asia* (New York, 2000), 165–229.
- 110 T. Srinivasan, *Irrigation and Water Supply: South India, 200 B.C.–1600 A.D.* (Chennai, 1991); K. Rajan, *Ancient Irrigation Technology: Sluice Technology in Tamil Nadu* (Thanjavur, 2008); Y. Subbarayalu, *South India under the Cholas* (New Delhi, 2012).
- 111 J. Shanmugasundaram et al., "Societal response to monsoon variability in Medieval South India: Lessons from the past for adapting to climate change", *Anthropocene Review* 4 (2017), 110–35.

- 112 D. Evans et al., "A comprehensive archaeological map of the world's largest preindustrial settlement complex at Angkor, Cambodia", *PNAS* 104 (2007), 14277–82; R. Fletcher et al., "Redefining Angkor: Structure and Environment in the Largest Low Density Urban Complex of the Pre-Industrial World", *Udaya* 4 (2003), 107–25.
- 113 P. Sharrock, "Garuḍa, Vajrapāṇi and religious change in Jayavarman VII's Angkor", *Journal of Southeast Asian Studies* 40 (2009), 331–51.
- 114 C. Pottier, "Some Evidence of an Inter-relationship between Hydraulic Features and Rice Field Patterns at Angkor during Ancient Times", *Journal of Sophia Asian Studies* 18 (2000), 99–119; R. Fletcher et al., "The Development of the Water Management System of Angkor: A Provisional Model", *Indo-Pacific Prehistory Association Bulletin* 28 (2008), 57–66. Ks. myös T. Maxwell ja J. Poncar, *Of Gods, Kings and Men: The Reliefs of Angkor Wat* (Lontoo, 2007); Chemburkar, "Dancing architecture at Angkor", 514–36
- 115 D. Penny et al., "Vegetation and Land-Use at Angkor, Cambodia", *Antiquity* 80 (2006), 599–614.
- 116 Liberman ja Buckley, "Impact of Climate Change on Southeast Asia", 1067; for Pagan, ks. M. Aung-Thwin, *Pagan: The Origins of Modern Burma* (Honolulu, 1985).
- 117 Wade, "Early Age of Commerce", 245–6.
- 118 P.-Y. Manguin, "Trading ships of the South China Sea: Shipbuilding techniques and their role in the development of Asian trade networks", *Journal of the Economic and Social History of the Orient* 36 (1993), 253–80; J. Stargardt, "Indian Ocean Trade in the Ninth and Tenth Centuries: Demand, Distance, and Profit", *South Asian Studies* 30 (2014), 35–55.
- 119 *Chau Ju-kua: His work on the Chinese and Arab Trade in the Twelfth and Thirteenth Centuries, Entitled Chu-fan-chi*, käänt. F. Hirth ja W. Rockhill (Pietari, 1911), 117–18.
- 120 Wade, "Early Age of Commerce", 244, 261.
- 121 M. Hall, *Farmers, Kings and Traders: The People of Southern Africa, 200 AD–1860 AD* (Chicago, 1987), 74–90.
- 122 T. Huffman, "The Soapstone Birds from Great Zimbabwe", *African Arts* 18 (1985), 68–100.
- 123 S. Chirikure, *Great Zimbabwe: Reclaiming a "Confiscated" Past* (Abingdon, 2021), 26–50, 78–107.
- 124 B. Zhao, "Global Trade and Swahili Cosmopolitan Material Culture: Chinese-Style Ceramic Shards from Sanje ya Kati and Songo Mnara (Kilwa, Tanzania)", *Journal of World History* 23 (2012), 49;

- S. Wynne-Jones, *A Material Culture: Consumption and Materiality on the Coast of Precolonial East Africa* (Oxford, 2016), 12–16, 63.
- 125 J. Fleischer, "Behind the Sultan of Kilwa's Rebellious Conduct: Local Perspectives on an International East African Town", teoksessa A. Reid ja P. Lane (toim.), *African Historical Archaeologies* (New York, 2004), 91–124.
- 126 A. LaViolette ja J. Fleischer, "Developments in Rural Life on the Eastern African Coast, AD 700–1500", *Journal of Field Archaeology* 43 (2018), 380–98.
- 127 M. Wood et al., "Zanzibar and Indian Ocean Trade in the First Millennium CE: The Glass Bead Evidence", *Archaeological and Anthropological Sciences* 9 (2017), 879–901; M. Horton, N. Boivin ja A. Crowther, "Eastern Africa and the Early Indian Ocean: Understanding Mobility in a Globalising World", *Journal of Egyptian History* 13 (2020), 393–4.
- 128 J. Fleischer, "Rituals of Consumption and the Politics of Feasting on the Eastern African Coast, AD 700–1500", *Journal of World Prehistory* 23 (2010), 195–217.
- 129 A. Kotarba-Morley et al., "Coastal landscape changes at Unguja Ukuu, Zanzibar: Contextualizing the archaeology of an early Islamic port of trade", *Journal of Island and Coastal Archaeology* (2022), 1–35.
- 130 H. De Weerdt, *Information, Territory, and Networks: The Crisis and Maintenance of Empire in Song China* (Cambridge, MA, 2016).
- 131 C.-C. Wu et al., "Impact of the early-ripening Champa rice – Are they aus?", *Research Square* (2020), 1–12; E. Anderson, *The Food of China* (New Haven, 1988); P.-T. Ho, "Early-ripening rice in Chinese history", *Economic History Review* 9 (1956), 200–18. Riisistä yleensä ks. R. Spengler et al., "A Journey to the West: The Ancient Dispersal of Rice Out of East Asia", *Rice* 14 (2021), 1–18.
- 132 E. Anderson, *Food and Environment in Early and Medieval China* (Philadelphia, 2014).
- 133 D. Herlihy, "Outline of Population Developments in the Middle Ages", teoksessa B. Herrmann, R. Sprandel ja U. Dirlmeier (toim.), *Determinanten der Bevölkerungsentwicklung im Mittelalter* (Weinheim, 1987), 1–23.
- 134 P. Schuster, "Die Krise des Spätmittelalters. Zur Evidenz eines sozial- und wirtschaftsgeschichtlichen Paradigmas in der Geschichtsschreibung des 20. Jahrhunderts", *Historische Zeitschrift* 269 (1999), 19–55.
- 135 Esimeriksi J. Xie, *Chinese Urbanism: Urban Form and Life in the Tang–Song Dynasties* (Singapore, 2020), 81.

- 136 Lieberman, *Strange Parallels*, 2, 91.
- 137 R. Fletcher, "The water management network of Angkor, Cambodia", *Antiquity* 82 (2008), 658–70.
- 138 Ibn al-Qalānišī, *The Damascus Chronicle of the Crusades, Extracted and Translated from the Chronicle of Ibn al-Qalānišī*, käändt. H. Gibb (Lontoo, 1932), 297.
- 139 Ibn al-Athīr, *The Annals of the Saljuq Turks: Selections from al-Kāmil fī l-tārikh of Izz al-Dīn Ibn al-Ibn al-Athīr*, käändt. D. Richards (Lontoo, 2002), 268–70; Raphael, *Climate and Political Climate*, 41–2, 74.
- 140 'Abd al-Latīf al-Baghdādī, *A Physician on the Nile: A Description of Egypt and Journal of the Famine Years*, käändt. T. Mackintosh-Smith (New York, 2021).
- 141 Vilhelm Tyroslainen, *Chronicon*, toim. R. Huygens, *Willem Tyrensis Archiepiscopi*, 2 vols (Turnhout, 1986), 1, 8.4, 388–9.
- 142 E. Xoplaki, "The medieval climate anomaly and Byzantium: a review of the evidence on climatic fluctuations, economic performance and societal change", *Quaternary Science Reviews* 136 (2016), 229–52; J. Preiser-Kapeller ja E. Mitsiou, "The Little Ice Age and Byzantium within the Eastern Mediterranean, ca. 1200–1350: An Essay on Old Debates and New Scenarios", teoksessa M. Bauch ja G. Schenk (toim.), *The Crisis of the 14th Century: Teleconnections between Environmental and Societal Change?* (Berliini, 2019), 203–4.
- 143 W. Klein, "A Christian Heritage on the Northern Silk Road: Archaeological and Epigraphic Evidence of Christianity in Kyrgyzstan", *Journal of the Canadian Society for Syriac Studies* 1 (2001), 85–100; Toonen et al., "Hydromorphic reevaluation", 32982–8; N. Pederson et al., "Pluvials, droughts, the Mongol Empire, and modern Mongolia", *PNAS* 111 (2014), 4375–9.
- 144 N. Di Cosmo, "State formation and periodization in Inner Asian History", *Journal of World History* 10 (1999), 1–40.
- 145 A. Lagamma, *Sahel: Art and Empires on the Shores of the Sahara* (New York, 2020), 60, 87–91.
- 146 E. Bovill, *The Golden Trade of the Moors: West African Kingdoms in the Fourteenth Century* (Princeton, NJ, 1995).
- 147 C. Rankin, C. Barrier ja T. Horsley, "Evaluating narratives of ecocide with the stratigraphic record at Cahokia Mounds State Historic Site, Illinois, USA", *Geoarchaeology* 36 (2021), 369–87; A. White et al., "Fecal stanols show simultaneous flooding and seasonal precipitation change correlate with Cahokia's population decline", *PNAS* 116 (2019), 5461–6; DuVal, "Mississippian Peoples' Worldview", 99–100.

- 148 B. Buckley et al., "Climate as a contributing factor in the demise of Angkor, Cambodia", *PNAS* 107 (2010), 6748–52.
- 149 L. Briggs, *The Ancient Khmer Empire* (Banglamung, 1999), 258; P. Sharrock ja C. Jacques, "'The Grief of Kings is the Suffering of their Subjects': A Cambodian King's Twelfth-Century Network of Hospitals", teoksessa C. Salguero (toim.), *In Buddhism and Medicine: An Anthology of Premodern Sources* (New York, 2017), 226–32.
- 150 Sharrock, "Garuḍa, Vajrapāṇi and religious change", 116; M. Masako, "The Discovery of Buddhist Statues at Banteay Kdei Temple, an Angkor Monument in Cambodia: Report on the Discovery of 274 Discarded Buddhist Statues and Four-sided Buddhist Stone Pillar", *Journal of Sophia Asian Studies* 19 (2001), 267–84.
- 151 D. Penny et al., "Geoarchaeological evidence from Angkor, Cambodia, reveals a gradual decline rather than a catastrophic 15th-century collapse", *PNAS* 116 (2019), 4871–6.
- 152 P. Strachan, *Imperial Pagan: Art and Architecture of Old Burma* (Honolulu, 1989); R. Wicks, *Money, Markets, and Trade in Early Southeast Asia: The Development of Indigenous Monetary Systems to AD 1400* (Ithaca, NY, 1992).
- 153 Aung-Thwin, *Pagan: The Origins of Modern Burma*, 167–81.
- 154 M. Htin Aung, *A History of Burma* (Cambridge, 1967).
- 155 Briggs, *Ancient Khmer Empire*, 258; ks. myös Sharrock, "Garuḍa, Vajrapāṇi and religious change", 111–51.
- 156 Dugmore, Keller ja McGovern, "Norse Greenland Settlement", 14–15; A. Dugmore et al., "Cultural adaptation, compounding vulnerabilities and conjunctures in Norse Greenland", *PNAS* 109 (2012), 3658–63; B. Zhao et al., "Prolonged drying trend coincident with the demise of Norse settlements in southern Greenland", *Science Advances* 8 (2022), 1–8.
- 157 Dugmore, Keller ja McGovern, "Norse Greenland Settlement", 18; E. Roesdahl, "Walrus Ivory: Demand, Supply, Workshops, and Vikings", teoksessa A. Mortensen ja S. Arge (toim.), *Viking and Norse in the North Atlantic: Select Papers from the Proceedings of the 14th Viking Congress* (Torshavn, 2005), 182–91.
- 158 H. Gulløv, "The nature of contact between native Greenlanders and Norse", *Journal of the North Atlantic* 1 (2008), 16–24; Dugmore et al., "Cultural adaptation", 3662.
- 159 D. Sear et al., "Human settlement of East Polynesia earlier, incremental, and coincident with prolonged South Pacific drought", *PNAS* 117 (2020), 8813–19; Flexner, *Oceania*, 13.

- 160 A. Ioannidis et al., "Native American gene flow into Polynesia predating Easter Island settlement", *Nature* 583 (2020), 572–7.
- 161 Flexner, *Oceania*, 14.
- 162 Ibid., 15.
- 163 P. Nunn, "The A.D. 1300 Event in the Pacific Basin", *Geographical Review* 97 (2007), 1–23.

TAUDIT JA UUDEN MAAILMAN SYNTY

- 1 M. Drompp, *Tang China and the Collapse of the Uighur Empire: A Documentary History* (Leiden, 2005); J. Shi, *The Economy of Western Xia: A Study of 11th to 13th Century Tangut Records* (Leiden, 2021).
- 2 S. West, "The Interpretation of a Dream: The Sources, Evaluation, and Influence of the 'Dongjing Meng Hua Lu'", *T'oung Pao* 71 (1985), 67–8.
- 3 P. Ebrey, *Emperor Huizong* (Cambridge, MA, 2014), 480–1.
- 4 Li Qingzhao, *Complete poems of Li Ch'ing-chao*, käännt. K. Rexroth (New York, 1982), 57.
- 5 M. Favreau, *The Horde: How the Mongols Changed the World* (Cambridge, MA, 2020); C. Atwood, "Six Pre-Chinggisid Genealogies in the Mongol Empire", *Archivum Eurasiae Medii Aevi* 19 (2012), 5–58.
- 6 Favreau, *The Horde*, 33–6.
- 7 N. Di Cosmo, "State formation and periodization in Inner Asian history", *Journal of World History* 10 (1999), 1–40.
- 8 T. Tekin, *A Grammar of Orkhon Turkic* (Bloomington, IN, 1968), 229–95; for the *sülde*, S. Dmitriev, "Istoriko-etnograficheskie aspekty politicheskoy kul'tury turko-mongolskikh kochevnikov" (julkaisematon väitöskirja, Antropologian ja etnologian museo, Venäjän tiedeakatemia, Pietari, 2000); Favreau, *The Horde*.
- 9 D. Sneath (toim.), *Imperial Statecraft: Political Forms and Techniques of Governance in Inner Asia, Sixth–Twentieth Centuries*, (Bellingham, WA, 2006), *passim*.
- 10 I. de Rachewiltz, "The Title Cinggis Qan/Qayan Reconsidered", teoksessa W. Heissig ja K. Sagaster (toim.), *Gedanke und Wirkung. Festschrift zum 90. Geburtstag von Nikolaus Poppe* (Wiesbaden, 1989), 281–98.
- 11 *The Secret History of the Mongols: A Mongolian Epic Chronicle of the Thirteenth Century*, käännt. I. de Rachewiltz (Leiden, 2004), ch. 154. Suomentanut Lauri Harvilahti: *Mongolien salainen historia*, Rosebud 2024. Ks. D. Durand-Guédy ja T. Masuya, "Seasonal capitals with permanent buildings in the Mongol empire", teoksessa

- D. Durand-Guédy (toim.), *Turko-Mongol Rulers, Cities and City Life* (Leiden, 2013), 224–35.
- 12 T. May, *The Mongol Art of War: Chinggis Khan and the Mongol Military System* (Barnsley, 2007).
 - 13 N. Pederson et al., "Pluvials, droughts, the Mongol Empire, and modern Mongolia", *PNAS* 111 (2014), 4375–9.
 - 14 W. Atwell, "Volcanism and Short-Term Climatic Change in East Asian and World History, c.1200–1699", *Journal of World History* 12 (2001), 42–3.
 - 15 W. Farris, *Japan's Medieval Population: Famine, Fertility, and Warfare in a Transformative Age* (Cambridge, MA, 2006), 34ff.
 - 16 Atwell, "Volcanism and Short-Term Climatic Change in East Asian and World History", 43–4.
 - 17 A. Silverstein, *Postal Systems in the Pre-Modern Islamic World* (Cambridge, 2009), 141–64.
 - 18 Ks. esim. G. Lane, "Persian Notables and the Families Who Underpinned the Ilkhanate", teoksessa R. Amitai ja M. Biran (toim.), *Nomads as Agents of Cultural Change: The Mongols and their Eurasian Predecessors* (Honolulu, 2015), 182–213.
 - 19 J. Pongratz et al., "Coupled climate–carbon simulations indicate minor global effects of wars and epidemics on atmospheric CO₂ between AD 800 and 1850", *The Holocene* 21 (2011), 843–51; Jon Henley, "Why Genghis Khan was good for the planet", *Guardian*, 26.1.2011.
 - 20 Toonen et al., "Hydromorphic reevaluation", 32,982–8; T. Khaidarov et al., "Biological Aspects of the Historical Urban Development of Jochi Ulus (Latter Half of the 13th–14th Centuries)", *Social Sciences* 10 (2015), 1047–53; K. Campbell, "The City of Otrar, Kazakhstan: Using Archaeology to Better Understand the Impact of the Mongol Conquest of Central Asia", teoksessa A. Otto, M. Herles ja K. Kaniuth (toim.), *Proceedings of the 11th International Congress on the Archaeology of the Ancient Near East* (Wiesbaden, 2020).
 - 21 Ks. ennen kaikkea T. Allsen, *Commodity and Exchange in the Mongol Empire: A Cultural History of Islamic Textiles* (Cambridge, 1997), ja T. Allsen, *Culture and Conquest in Mongol Eurasia* (Cambridge, 2001).
 - 22 G. Lane, *Genghis Khan and Mongol Rule* (Westport, CT, 2004), 57–8.
 - 23 T. Masuya, "Seasonal capitals with permanent buildings in the Mongol Empire", teoksessa Durand-Guédy (toim.), *Turko-Mongol Rulers, Cities and City Life*, 223–56; P. Jackson, *The Mongols and the Islamic World: From Conquest to Conversion* (New Haven, 2017), 95ff.
 - 24 J. Bemmann et al., "Mapping Karakorum, the capital of the Mongol Empire", *Antiquity* (2021), 1–20; K. Sagaster, "Die mongolische

- Hauptstadt Karakorum”, *Beiträge zur Allgemeinen und Vergleichenden Archäologie* 19 (1999), 113–28.
- 25 V. Egorov, Историческая география Золотая Орды в XIII–XIV вв (Москва, 1985).
- 26 A. Goldschmidt, ”Epidemics and Medicine during the Northern Song Dynasty: Revival of Cold Damage Disorders (Shanghan)”, *T'oung Pao* 93 (2007), 53–109.
- 27 Green, ”Climate and Disease in Medieval Eurasia”.
- 28 M. Green, ”The Four Black Deaths”, *American Historical Review* 125 (2020), 1601–31.
- 29 N. Fancy ja M. Green, ”Plague and the Fall of Baghdad (1258)”, *Medical History* 65 (2021), 157–77.
- 30 M.-L. Derat, ”Du lexique aux talismans: occurrences de la peste dans la Corne de l’Afrique du XIV^e au XVI^e siècle”, *Afriques* 9 (2018).
- 31 G. Chouin ja C. Decorse, ”Prelude to the Atlantic Trade: New Perspectives”, *Journal of African History* 51 (2010), 142–3; R. Hymes, ”A Hypothesis on the East Asian Beginnings of the Yersinia pestis Polytomy”, teoksessa Green (toim.), *Pandemic Disease in the Medieval World*, 285–308; G. Chouin, ”Reflections on Plague in African History (14th–19th c.)”, *Afriques* 9 (2018), 1–47.
- 32 Green, ”Four Black Deaths”, 1616–18; J. Masson Smith, ”Mongol Campaign Rations: Milk, Marmots, and Blood?”, *Journal of Turkish Studies* 8 (1984), 223–8.
- 33 M. Green, ”How a microbe becomes a pandemic: a new story of the Black Death”, *Lancet Microbe* 1 (2020), 311–12.
- 34 Y. Cui et al., ”Historical Variations in Mutation Rate in an Epidemic Pathogen, Yersinia pestis”, *PNAS* 110 (2013), 577–82.
- 35 Fancy ja Green, ”Plague and the Fall of Baghdad”, 158.
- 36 Green, ”Four Black Deaths”, 1629–30.
- 37 B. Alloway et al., ”Archaeological implications of a widespread 13th Century tephra marker across the central Indonesian Archipelago”, *Quaternary Science Reviews* 155 (2017), 86–99.
- 38 R. Mutaqin, ”Landscape evolution on the eastern part of Lombok (Indonesia) related to the 1257 CE eruption of the Samalas Volcano”, *Geomorphology* 327 (2019), 338–50.
- 39 J. Emile-Geay et al., ”Volcanoes and ENSO over the past millennium”, *Journal of Climate* 21 (2008), 3134–48; M. Toohey et al., ”Disproportionately strong climate forcing from extratropical explosive volcanic eruptions”, *Nature Geoscience* 12 (2019), 100–7; M. Baroni et al., ”Persistent Draining of the Stratospheric to Be Reservoir after

- the Samalas Volcanic Eruption (1257 CE)", *Journal of Geophysical Research: Atmospheres* 29 (2016), 7082–97.
- 40 B. Campbell, "Global Climates, the 1257 Mega-Eruption of Samalas volcano, Indonesia, and the English Food Crisis of 1258", *Transactions of the RHS* 27 (2017), 87–121.
- 41 Campbell, *Great Transition*, 57–8.
- 42 M. Sigl et al., "A new bipolar ice core record of volcanism from WAIS Divide and NEEM and implications for climate forcing of the last 2000 years", *Journal of Geophysical Research: Atmospheres* 118 (2013), 1151–69; Sigl et al., "Timing and climate forcing of volcanic eruptions", 543–54.
- 43 S. Guillet et al., "Climate response to the Samalas volcanic eruption in 1257 revealed by proxy records", *Nature Geoscience* 10 (2017), 123–8.
- 44 I. Usokin et al., "Solar activity during the Holocene: the Hallstatt cycle and its consequence for grand minima and maxima", *Astronomy & Astrophysics* 587 (2016), 1–10.
- 45 M. Stuiver ja P. Quay, "Changes in atmospheric carbon-14 attributed to a variable Sun", *Science* 207 (1980), 11–19; W. Hong et al., "Calibration curve from AD 1250 to AD 1650 by measurements of tree-rings grown on the Korean peninsula", *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* 294 (2013), 425–9; A. Fogtmann-Schulz et al., "Changes in Solar Activity during the Wolf Minimum – New Insights from a High Resolution (^{14}C) Record Based on Danish Oak", *Radiocarbon* 63 (2021), 91–104.
- 46 G. Feulner ja S. Rahmstorf, "On the effect of a new grand minimum of solar activity on the future climate of the Earth", *Geophysical Research Letters* 37 (2010), 1–5.
- 47 Campbell, *Great Transition*, 199–201.
- 48 E. Koster, "Aeolian Environments", teoksessa E. Koster (toim.), *The Physical Geography of Western Europe* (Oxford, 2007), 139–60.
- 49 M. De Keyzer, "All we are is dust in the wind: The social causes of a 'subculture of coping' in the late medieval coversand belt", *Journal for the History of Environment and Society* 1 (2016), 1–35; T. Soens, "Threatened by the Sea, Condemned by Man? Flood Risk and Environmental Inequalities along the North Sea Coast, 1200–1800", teoksessa G. Massard-Guilbaud ja R. Rodger (toim.), *Environmental and Social Justice in the City: Historical Perspectives* (Cambridge, 2011), 91–111.
- 50 Campbell, *Great Transition*, 253–61.
- 51 R. Oram, "'The Worst Disaster Suffered by the People of Scotland in Recorded History': Climate Change, Dearth and Pathogens in the Long

- Fourteenth Century”, *Proceedings of the Society of Antiquaries of Scotland* 144 (2015), 223–44.
- 52 B. Campbell, “The European Mortality Crises of 1346–52 and Advent of the Little Ice Age”, teoksessa D. Collett ja M. Schuh (toim.), *Famines during the “Little Ice Age” (1300–1800): Socionatural Entanglements in Premodern Societies* (Cham, 2018), 23–4.
- 53 Campbell, *Great Transition*, 6.
- 54 Oram, “Worst Disaster”, 228.
- 55 J.-H. Lee, “Climate Change in East Asia and Agricultural Production Activities in Koryō and Japan during the Twelfth–Thirteenth Centuries”, *International Journal of Korean History* 12 (2008), 133–56; Q. Yan et al., “Simulated warm periods of climate over China during the last two millennia: The Sui-Tang warm period versus the Song-Yuan warm period”, *JGR Atmospheres* 120 (2015), 2229–41.
- 56 T. Li, “The Mongol Yuan Dynasty and the Climate, 1260–1360”, teoksessa Bauch ja Schenk (toim.), *Crisis of the 14th Century*, 157–8, 163.
- 57 T. Brook, *Troubled Empire: China in the Yuan and Ming Dynasties* (Cambridge, MA, 2010), 72.
- 58 Li, “The Mongol Yuan Dynasty”, 158, 165.
- 59 W. Tucker, “Environmental Hazards, Natural Disasters, Economic Loss, and Mortality in Mamluk Syria”, *Mamlük Studies* 3 (1999), 114–15.
- 60 M. Bauch et al., “A prequel to the Dantean Anomaly: the precipitation seesaw and droughts of 1302 to 1307 in Europe”, *Climate of the Past* 16 (2020), 2343–58.
- 61 P. Slavin, “The Great Bovine Pestilence and its economic and environmental consequences in England and Wales, 1318–50”, *Economic History Review* 65 (2021), 1239.
- 62 Camuffo, “When the Lagoon was frozen over”, 21–2.
- 63 B. Campbell, “Nature as historical protagonist”, *Economic History Review* 63 (2010), 281–314.
- 64 P. Frankopan, *The First Crusade: The Call from the East* (Lontoo, 2012), 119–20.
- 65 Anderson, Johnson ja Koyama, “Jewish Persecutions and Weather Shocks”, 928–9.
- 66 S. van Hees, “The Great Fire in Cairo in 1321”, teoksessa G. Schenk (toim.), *Historical Disaster Experiences: Towards a Comparative and Transcultural History of Disasters across Asia and Europe* (Cham, 2017), 307–26.
- 67 R. Irwin, *The Middle East in the Middle Ages: The Early Mamluk Sultanate, 1250–1382* (Carbondale, IL, 1986), 49–50.

- 68 E. Chaney, "Revolt on the Nile: Economic Shocks, Religion, and Political Power", *Econometrica* 81 (2013), 2033–53.
- 69 A. Kors ja E. Peters (toim.), *Witchcraft in Europe, 400–1700: A Documentary History* (Philadelphia, 2001), 119.
- 70 P. Nanni, "Facing the Crisis in Medieval Florence: Climate Variability, Carestie, and Forms of Adaptation in the First Half of the Fourteenth Century", teoksessa Bauch ja Schenk (toim.), *Crisis of the 14th Century*, 169–89.
- 71 Ibn Faḍl Allāh al-‘Umarī, *Masālik al-absār fī mamālik al-amṣār*, teoksessa Hopkins ja Levzion (toim.), *Corpus of Early Arabic Sources*, 268–71.
- 72 Mansa Musan matkasta ks. H. Collet, "Échos d'Arabie. Le Pèlerinage à La Mecque de Mansa Musa (724–725/1324–1325) d'après des Nouvelles Sources", *History in Africa* 46 (2019), 105–35.
- 73 Slavin, "Great Bovine Pestilence", 1242–3.
- 74 Ibid., 1246–7.
- 75 W. Jordan, *The Great Famine: Northern Europe in the Early Fourteenth Century* (Princeton, 1996), 182–8.
- 76 P. Slavin, "Death by the Lake: Mortality Crisis in Early Fourteenth-Century Central Asia", *Journal of Interdisciplinary History* 50 (2019), 69–71.
- 77 D. Chwolson, *Syrisch-nestorianische Grabinschriften aus Semirjetschie, Neue Folge* (Pietari, 1897); Slavin, "Death by the Lake", 62–4, 73; M. Spyrou et al., "The source of the Black Death in fourteenth-century central Eurasia", *Nature* 606 (2022), 718–24.
- 78 M. Green, "Taking 'Pandemic' Seriously: Making the Black Death Global", teoksessa Green (toim.), *Pandemic Disease in the Medieval World*, 32–4.
- 79 N. Varlık, "New Science and Old Sources: Why the Ottoman Experience of Plague Matters", teoksessa Green (toim.), *Pandemic Disease in the Medieval World*, 193–228.
- 80 Green, "Four Black Deaths", 1622–3; Varlık, "New Science and Old Sources", 207–16.
- 81 V. Ciociltan, *The Mongols and the Black Sea Trade in the Thirteenth and Fourteenth Centuries* (Leiden, 2012), 150ff.
- 82 Campbell, "European Mortality Crises", 21–3.
- 83 Brázdil et al., "Past locust outbreaks", 345.
- 84 Camuffo ja Enzi, "Locust Invasions", 56.
- 85 Campbell, "European Mortality Crises", 19.

- 86 H. Helama et al., "Something old, something new, something borrowed. New insights to human–environment interaction in medieval Novgorod inferred from tree rings", *Journal of Archaeological Science: Reports* 13 (2017), 341–50.
- 87 N. Di Cosmo, "Black Sea Emporia and the Mongol Empire: A Reassessment of the Pax Mongolica", *Journal of the Economic and Social History of the Orient* 53 (2010), 83–108; M. Grinberg, "Janibeg's Last Siege of Caffa (1346–1347) and the Black Death: The Evidence and Chronology Revisited", *Tiurkologicheskie Issledovaniya* 1/2 (2018), 19–32.
- 88 M. Bauch ja A. Engel, "Die 1340er Jahre als Schlüsseljahrzehnt der 'Great Transition'. Eine klimahistorische Perspektive auf den Vorabend des Schwarzen Todes", teoksessa A. Berner, S. Leenen ja S. Maus (toim.), *Pest! Sonderausstellung des LWL-Museums für Archäologie in Herne* (2019), 76–82; J. Esper et al., "Eastern Mediterranean summer temperatures since 730 CE from Mt. Smolikas tree-ring densities", *Climate Dynamics* 54 (2020), 1367–82.
- 89 H. Barker, "Laying the Corpses to Rest: Grain, Embargoes, and *Yersinia pestis* in the Black Sea, 1346–48", *Speculum* 96 (2021), 91–126.
- 90 R. Hymes, "Buboes in Thirteenth Century China: Evidence from Chinese Medical Writings", *The Medieval Globe* 8 (2022), 3–59
- 91 M. Green, "Editor's Introduction", teoksessa Green (toim.), *Pandemic Disease in the Medieval World*, 9.
- 92 A. More, "Next-generation ice core technology reveals true minimum natural levels of lead (Pb) in the atmosphere: Insights from the Black Death", *GeoHealth* 1 (2017), 211–19.
- 93 Petrarca, *Epistolae de rebus familiaribus et variae*, in R. Horrox (toim. ja käant.), *The Black Death* (Manchester, 1994), 248.
- 94 G. Christakos et al., *Interdisciplinary Public Health Reasoning and Epidemic Modelling: The Case of Black Death* (Berliini, 2005), s. 217–18.
- 95 P. Guzowski, C. Kuklo ja R. Poniat, "O metodach pomiaru natężenia epidemii i zaraz w preindustrialnej Europie w demografii historycznej", teoksessa K. Polek ja Ł. Sroka (toim.), *Epidemie w dziejach Europy: konsekwencje społeczne, gospodarcze i kulturowe* (Kraków, 2016), 119–44; P. Guzowski et al., "Did the Black Death reach the Kingdom of Poland in the middle of the 14th century?", *arXiv: 2111/02714 – preprint* (2021), 1–36; A. Izdebski et al., "Palaeoecological data indicates land-use changes across Europe

- linked to spatial heterogeneity in mortality during the Black Death pandemic”, *Nature Ecology & Evolution* 6 (2022), 297–306.
- 96 O. Benedictow, *The Black Death: The Complete History, 1346–1354* (Woodbridge, 2004), 95.
 - 97 A. Izdebski et al., “Big Data Palaeoecology reveals significant variation in Black Death mortality in Europe”, *Research Square* (2021).
 - 98 S. Borsch, ”Plague Depopulation and Irrigation Decay in Medieval Egypt”, teoksessa Green (toim.), *Pandemic Disease in the Medieval World*, 125–6.
 - 99 G. Geltner, ”The Path to Pistoia; Urban Hygiene before the Black Death”, *Past & Present* 246 (2020), 3–33.
 - 100 S. Borsch ja T. Sabraa, ”Refugees of the Black Death: Quantifying Rural Migration for Plague and Other Environmental Disasters”, *Annales de Démographie Historique* 134 (2017), 63–93; D. Davis, ”The Characteristics of Global Rat Populations”, *American Journal of Public Health* 41 (1951), 158–63.
 - 101 J. Loiseau, *Reconstruire la maison du sultan, 1350–1450: ruine et recomposition de l’ordre urbain au Caire*, 2 vols (Cairo, 2011).
 - 102 Borsch ja Sabraa, ”Refugees of the Black Death”, 63–93; P. Galanaud et al., ”Mortality and demographic recovery in early post-black death epidemics: Role of recent emigrants in medieval Dijon”, *PLOS One* 15 (2020), 1–20.
 - 103 W. McNeill, *Plagues and Peoples* (New York, 1967), 64–5.
 - 104 K. Puchstein, ”Zur Vogelwelt der schleswig-holsteinischen Knicklandschaft mit einer ornitho-ökologischen Bewertung der Knickstrukturen”, *Corax* 8 (1980), 62–106; R. Schreg, ”Plague and Desertion – A Consequence of Anthropogenic Landscape Change? Archaeological Studies in Southern Germany”, teoksessa Bauch and Schenk (toim.), *Crisis of the 14th Century*, 240.
 - 105 Campbell, ”European Mortality Crises”, 26–9.
 - 106 Frankopan, *Silk Roads (Silkkiet)*, 191–2.
 - 107 P. Slavin, ”Out of the West: Formation of Permanent Plague Reservoir in South-Central Germany (1349–1356) and its Implications”, *Past & Present* 252 (2021), 3–51.
 - 108 Henry Knighton, *Chronicon Henrici Knighton vel Cnitthon monachi Leycestrensis*, 2 vols (Lontoo, 1889–95), 2, 62–3.
 - 109 Oram, ”Worst Disaster”, 230–1.
 - 110 Al-Maqrīzī, *Kitāb al-Sulūk li-Ma’rifat Duwal al-Mulūk*, 12 vols (Cairo, 1956–73), 4, 227, lainattu teoksessa Borsch, ”Plague Depopulation”, 129–35.

- 111 Varlık, "New Science and Old Sources", 201–7.
- 112 Ibid., 196; N. Varlık, *Plague and Empire in the Early Modern Mediterranean World: The Ottoman Experience, 1347–1600* (Cambridge, 2015); R. Singer, "The Black Death in the Maghreb: A Call to Action", *Journal of Medieval Worlds* 2 (2020), 115–23.
- 113 Chouin, "Reflections on Plague in African History", 1–47; D. Gallagher ja S. Dueppen, "Recognizing plague epidemics in the archaeological record of West Africa", *Afriques* 9 (2018); Derat, "Du lexique aux talismans: occurrences de la peste dans la Corne de l'Afrique du XIII^e au XI^e siècle"; M. Green, "Putting Africa on the Black Death Map: Narratives from Genetics and History", *Afriques* 9 (2018).
- 114 N. Langer, "The Black Death in Russia: Its Effects upon Urban Labor", *Russian History* 2 (1975), 53–67.
- 115 G. Mellinger, "The Silver Coins of the Golden Horde: 1310–1358", *Archivum Eurasiae Medii Aevi* 7 (1987–91), 153–211; U. Schamiloglu, "The Impact of the Black Death on the Golden Horde: Politics, Economy, Society, Civilisation", *Golden Horde Review* 5 (2017), 331.
- 116 M. Balard, "Black Sea Slavery in Genoese Notarial Sources, 13th–15th Centuries", teoksessa F. Roşu (toim.), *Slavery in the Black Sea Region, c.900–1900: Forms of Unfreedom at the Intersection between Christianity and Islam* (Leiden, 2022), 19–40.
- 117 Schamiloglu, "Impact of the Black Death", 328.
- 118 R. Frost, *The Oxford History of Poland–Lithuania*, vol. 1: *The Making of the Polish–Lithuanian Union, 1385–1569* (Oxford, 2015), 18–35.
- 119 M. Biran, "The Chaghadaids and Islam: The Conversion of Tarmashirin Khan (1331–34)", *Journal of the American Oriental Society* 122 (2002), 742–52; W. Klein, "Nestorianische Inschriften in Kirgizistan: Ein Situationsbericht", *Symposium Syriacum* 7 (1998), 661–9.
- 120 Schamiloglu, "Impact of the Black Death", 336–7.
- 121 Borsch, "Plague Depopulation", 135–48.
- 122 Milesen ja Brookes, *Peasant Perceptions of Landscape*, 245–50.
- 123 S. Borsch, *The Black Death in England and Egypt: A Comparative Study* (Cairo, 2005).
- 124 J. Klunk et al, "Evolution of immune genes is associated with Black Death", *Nature* 611 (2022), 312–9.
- 125 S. DeWitte ja M. Lewis, "Medieval menarche: Changes in pubertal timing before and after the Black Death", *American Journal of Human Biology* 33 (2020), 1–15. Ks. myös S. DeWitte, "Stress, sex, and

- plague: Patterns of developmental stress and survival in pre- and post-Black Death London”, *American Journal of Human Biology* 30 (2018), 1–15.
- 126 J. Teplitsky, ”Imagined Immunities: Medieval Myths and Modern Histories of Jews and the Black Death,” *AJS Review: The Journal of the Association for Jewish Studies* 46 (2022), 32–46.
- 127 J. Belich, *The World the Plague Made. The Black Death and the Rise of Europe* (Princeton, 2022), 50.
- 128 S. Einbinder, *After the Black Death: Plague and Commemoration among Iberian Jews* (Philadelphia, 2018).
- 129 Belich, *The World the Plague Made*, 131–5.
- 130 Ibid., 99.
- 131 Ibid., 89.
- 132 A. Carmichael, ”Plague Persistence in Western Europe: A Hypothesis”, teoksessa Green (toim.), *Pandemic Disease in the Medieval World*, 157–91.
- 133 G. Pinto, ”Dalla tarda antichità alla metà del XVI secolo”, teoksessa L. Del Panta et al. (toim.), *La popolazione italiana dal Medioevo ad oggi* (Rome, 1996), 17–71, at 59–61.
- 134 Belich, *The World the Plague Made*, 88, 123
- 135 Ibid., passim.
- 136 C. Camenisch, *Endlose Kälte. Witterungsverlauf und Getreidepreise in den Burgundischen Niederlanden im 15. Jahrhundert* (Basel, 2015).
- 137 C. Camenisch, ”The 1430s: a cold period of extraordinary internal climate variability during the early Spörer Minimum with social and economic impacts in north-western and central Europe”, *Climate of the Past* 12 (2016), 2107–26.
- 138 M. Bauch, ”The Day the Sun Turned Blue: A Volcanic Eruption in the Early 1460s and its Possible Climatic Impact – a Natural Disaster Perceived Globally in the Late Middle Ages?”, teoksessa G. Schenk (toim.), *Historical Disaster Experiences: A Comparative and Transcultural Survey across Asia and Europe* (Heidelberg, 2017), 107–38.
- 139 C. Ballard, ”The Lizard in the Volcano: Narratives of the Kuwae Eruption”, *Contemporary Pacific* 32 (2020), 98–123.
- 140 P. Brown, ”*Ventus vehemens et terribilis per totam Angliam*: Responses and Reactions to a Short-term Crisis in the British Isles”, teoksessa Bauch ja Schenk (toim.), *Crisis of the 14th Century*, 24–42.
- 141 C. Pfister et al., ”The meteorological framework and the cultural memory of three severe winter-storms in early eighteenth-century Europe”, *Climate Change* 101 (2010), 281.

- 142 J. Allen, "Trees and their response to wind: mid Flandrian strong winds, Severn Estuary and inner Bristol Channel, southwest Britain", *Philosophical Transactions of the Royal Society B* 338 (1992), 335–64.

UUSISTA EKOLOGISISTA HORISONTEISTA

- 1 I. Wallerstein, *The Modern World System*, vol. 1: *Capitalist Agriculture and the Origins of the European World Economy in the Sixteenth Century* (New York, 1974).
- 2 B. Van Loo, *De Bourgondiërs* (Amsterdam, 2019).
- 3 R. Frost, *The Oxford History of Poland–Lithuania*, vol. 1: *The Making of the Polish Lithuanian Union, 1385–1569* (Oxford, 2015), 28–30; D. Kołodziejczyk, *The Crimean Khanate and Poland–Lithuania* (Leiden, 2011), 5–8.
- 4 Y. Ayalon, *Natural Disasters in the Ottoman Empire: Plague, Famine, and Other Misfortunes* (Cambridge, 2014), 21–60; J. Emmert, "The Battle of Kosovo: Early Reports of Victory and Defeat", teoksessa W. Vucinich ja J. Emmert (toim.), *Kosovo: Legacy of a Medieval Battle* (Minneapolis, MN, 1991), 19–40; D. Djoedjević, "The Tradition of Kosovo and the Formation of Modern Serbian Statehood in the Nineteenth Century", teoksessa Vucinich ja Emmert (toim.), *Kosovo*, 309–30.
- 5 R. Bulliet, "The Other Siege of Vienna and the Ottoman Threat: An Essay in Counter-Factual History", *ReOrient* 1 (2015), 11–22.
- 6 M. Iyigun, "Luther and Suleyman", *Quarterly Journal of Economics* 123 (2008), 1465–94.
- 7 A. Mikhail, *God's Shadow: Sultan Selim, his Ottoman Empire, and the Making of the Modern World* (New York, 2020), 248, 265.
- 8 V. Aksan ja D. Goffman (toim.), *The Early Modern Ottomans: Remapping the Empire* (New York, 2007).
- 9 P. Beaujard, "Un seul système-monde avant le 16e siècle? L'océan Indien au cœur de l'intégration de l'hémisphère Afro-Eurasien", teoksessa P. Beaujard, L. Berger ja P. Norel (toim.), *Histoire globale, mondialisations et capitalisme* (Pariisi, 2009), 82–148.
- 10 G. Casale, "'The Ottoman 'Discovery' of the Indian Ocean in the Sixteenth Century", teoksessa J. Bentley, R. Bridenthal ja K. Wagen (toim.), *Seascapes: Maritime Histories, Littoral Cultures, and Transoceanic Exchanges* (Honolulu, 2007), 87–104.
- 11 A. Peacock, "Jeddah and the Red Sea Trade in the Sixteenth Century: Arabian Contexts and Imperial Policy", teoksessa D. Agius et al. (toim.), *Human Interaction with the Environment in the Red*

- Sea* (Leiden, 2017), 290–322; S. Özbaran, "A Turkish Report on the Red Sea and the Portuguese in the Indian Ocean (1525)", teoksessa S. Özbaran (toim.), *The Ottoman Response to European Expansion: Studies on Ottoman–Portuguese Relations in the Indian Ocean and Ottoman Administration in the Arab Lands during the Sixteenth Century* (Istanbul, 1994), 99–110.
- 12 V. Krebs, *Medieval Ethiopian Kingship, Craft, and Diplomacy with Latin Europe* (Cham, 2021).
- 13 Ibid., 78–9.
- 14 Flexner, *Oceania*, 4.
- 15 T. Brook, "Nine Sloughs: Profiling the Climate History of the Yuan and Ming Dynasties, 1260–1644", *Journal of Chinese History* 1 (2017), 54–5.
- 16 E. Farmer, *Zhu Yuanzhang and Early Ming Legislation: The Reordering of Chinese Society Following the Era of Mongol Rule* (Leiden, 1995); T. Brook, *The Troubled Empire: China in the Yuan and Ming Dynasties* (Cambridge, MA, 2010).
- 17 J. Yin, X. Fang ja Y. Su, "Correlation between climate and grain harvest fluctuations and the dynastic transitions and prosperity in China over the past two millennia", *The Holocene* 26 (2016), 1914–23; C. Gao et al., "Volcanic climate impacts can act as ultimate and proximate causes of Chinese dynastic collapse", *Communications Earth and Environment* 2 (2021), 1–11.
- 18 Y. Tai et al., "The impact of Ming and Qing dynasty maritime bans on trade ceramics recovered from coastal settlements in northern Sumatra, Indonesia", *Archaeological Research in Asia* 21 (2020), 1–18.
- 19 Ma Huan, *Ying-yai sheng-lan: The Overall Survey of the Ocean's Shores* (1433), translated from the Chinese text edited by Feng Ch'eng-chün, käännt. J. Mills (Cambridge, 1970), 127–8.
- 20 G. Wade, "Early Muslim expansion in South-East Asia, eighth to fifteenth centuries", teoksessa D. Morgan ja A. Reid (toim.), *New Cambridge History of Islam*, vol. 3: *The Eastern Islamic World, Eleventh to Eighteenth Centuries* (Cambridge, 2011), 388–9. For early gravestones, L. Kalus ja C. Guillot, "Réinterprétation des plus anciennes stèles funéraires islamiques nousantariennes: II. La stèle de Leran (Java) datée de 475/1082 et les stèles associées", *Archipel* 67 (2004), 17–36.
- 21 Wade, "Early Muslim expansion", 391–2.
- 22 T. Pigeaud, *Nagarakertagama: Java in the 14th Century: A Study in Cultural History: The Nāgara-Kērtāgama by Rakawi Prapañca of Majapahit, 1365 A.D.* (The Hague, 1960).

- 23 *Bābur-Nāma*, 186.
- 24 Ibid., 350.
- 25 Ks. kuitenkin myös G. Miller et al., "Abrupt onset of the Little Ice Age triggered by volcanism and sustained by sea-ice/ocean feedbacks", *Geophysical Research Letters* 39 (2012), 1–5.
- 26 Flexner, *Oceania*, 28–30; G. Clark, D. Burley ja T. Murray, "Monumentality and the development of the Tongan maritime chiefdom", *Antiquity* 82 (2008), 994–1008.
- 27 G. Peterson, "Indigenous island empires: Yap and Tonga considered", *Journal of Pacific History* 35 (2000), 5–27.
- 28 Flexner, *Oceania*, 30–1.
- 29 C. Townsend, *Fifth Sun: A New History of the Aztecs* (New York, 2019).
- 30 R. Hassig, *Trade, Tribute, and Transportation: The Sixteenth-Century Political Economy of the Valley of Mexico* (Norman, OH, 1993), 56–64.
- 31 C. Dodds Pennock, "Aztecs Abroad? Uncovering the Early Indigenous Atlantic", *American Historical Review* 125 (2020), 787–814.
- 32 D. Kennett ja N. Marwan, "Climatic volatility, agricultural uncertainty, and the formation, consolidation and breakdown of preindustrial agrarian states", *Philosophical Transactions of the Royal Society A* 373 (2015), 1–17; C. Morehart, "Mapping ancient chinampa landscapes in the Basin of Mexico: a remote sensing and GIS approach", *Journal of Archaeological Science* 39 (2012), 2541–51.
- 33 A. Palerm, *Obras Hidráulicas Prehispánicas en el Sistema Lacustre del Valle de México* (Mexico City, 1973), 16–20.
- 34 R. Hassig, "The Famine of One Rabbit: Ecological Causes and Social Consequences of a Pre-Columbian Calamity", *Journal of Anthropological Research* 37 (1981), 172–82; D. Stahle et al., "Major Mesoamerican droughts of the past millennium", *Geophysical Research Letters* 38 (2011), 1–4.
- 35 A. Kovar, "The Physical and Biological Environment of the Basin of Mexico", teoksessa W. Sanders et al. (toim.), *The Teotihuacán Valley Project, Final Report, I: The Natural Environment, Contemporary Occupation and 16th Century Population of the Valley* (University Park, PA, 1970), 28–9; Gill et al., "Drought and the Maya Collapse", 298.
- 36 N. Davies, *The Aztecs* (Lontoo, 1977), 93–102.
- 37 Hassig, "Famine of One Rabbit", 178–80.
- 38 M. Masson, "Resiliency and cultural reconstitution of the postclassic Mayapan confederacy and its aftermath", teoksessa J. Hendon, L. Overholtzer ja R. Joyce (toim.), *Mesoamerican Archaeology: Theory and Practice* (Oxford, 2021), 278–314; D. Kennett et al., "Drought-Induced

- Civil Conflict among the Ancient Maya”, *Nature Communications* 13 (2022), 1–10.
- 39 R. Keating, ”Urban Settlement Systems and Rural Sustaining Communities: An Example from Chan Chan’s Hinterland”, *Journal of Field Archaeology* 2 (1975), 215–27; J. Moore ja C. Mackey, ”The Chimú empire”, teoksessa Silverman ja Isbell (toim.), *Handbook of South American Archaeology*, 784–6.
- 40 Moore ja Mackey, ”Chimú empire”, 789–96.
- 41 G. Prieto et al., ”A mass sacrifice of children and camelids at the Huanchaquito-Las Llamas site, Moche Valley, Peru”, *Plos One* 14 (2019), 1–29.
- 42 D. Socha, J. Reinhard ja R. Chávez Perea, ”Inca Human Sacrifices on Misti Volcano (Peru)”, *Latin American Antiquity* 32 (2021), 138–53.
- 43 R. Covey, ”The Inca Empire”, teoksessa Silverman ja Isbell, *Handbook of South American Archaeology*, 814–16; T. Bray, ”The role of chicha in Inca state expansion: a distributional study of Inca aríbalos”, teoksessa J. Jennings ja B. Bowser (toim.), *Drink, Power and Society in the Andes* (Tallahassee, FL, 2009), 108–32.
- 44 A. Chepstow-Lusty et al., ”Putting the rise of the Inca Empire within a climatic and land management context”, *Climate of the Past* 5 (2009), 375–88.
- 45 M. Malpass ja S. Alconini (toim.), *Distant Provinces in the Inka Empire: Toward a Deeper Understanding of Inka Imperialism* (Iowa City, 2010), 75–107, 151–71, 260–78.
- 46 J. Hyslop, *The Inca Road System* (New York, 1984).
- 47 Covey, ”Inca Empire”, 816.
- 48 G. Atchison et al., ”Lost crops of the Incas: Origins of domestication of the Andean pulse crop tarwi, *Lupinus mutabilis*”, *American Journal of Botany* 103 (2016), 1592–1606; A. Chepstow-Lusty et al., ”Evaluating social economic change in the Andes using oribatid mite abundances as indicators of domestic animal densities”, *Journal of Archaeological Science* 34 (2007), 1178–86.
- 49 A. Franco, S. Galiani ja P. Lavado, ”Long-term effects of the Inca Road”, NBER Working Paper 28979 (2021), 1–30.
- 50 Z. Ahmad ja L. Chicoine, ”Silk Roads to Riches: Persistence along an Ancient Trade Network”, MPRA Paper 105146, University Library of Munich (2021), 1–96.
- 51 W. Woods, ”Population nucleation, intensive agriculture, and environmental degradation: The Cahokia example”, *Agriculture and Human Values* 21 (2004), 255–61; D. Pompeiani et al., ”The

- environmental impact of a pre-Columbian city based on geochemical insights from lake sediment cores recovered near Cahokia”, *Quaternary Research* 91 (2019), 714–28; S. Munoz et al., ”Cahokia’s emergence and decline coincided with shifts of flood frequency on the Mississippi River”, *PNAS* 112 (2015), 6319–24; White et al., ”Fecal sterols show simultaneous flooding and seasonal precipitation change correlate with Cahokia’s population decline”, 5461–6.
- 52 Rankin, Barrier ja Horsley, ”Evaluating narratives of ecocide with the stratigraphic record at Cahokia Mounds State Historic Site, Illinois, USA”, 369–87.
- 53 Benson, Pauketat ja Cook, ”Cahokia’s Boom and Bust”, 467–83; T. Pauketat ja T. Emerson (toim.), *Cahokia: Domination and Ideology in the Mississippian World* (Lincoln, NB, 1997).
- 54 Toso, ”Fishing intensification”, 1–14; R. Grove, ”El Niño Chronology and the Little Ice Age”, teoksessa R. Grove ja G. Adamson, *El Niño in World History* (Lontoo, 2018), 53–5.
- 55 L. Golombok ja D. Wilber, *The Timurid Architecture of Iran and Turan*, 2 vols (Princeton, 1988).
- 56 P. Jackson, *The Delhi Sultanate: A Political and Military History* (Cambridge, 1999); E. Barbier, *Emergence of the World Economy: How Economies have Developed through Natural Resource Exploitation* (Cambridge, 2011), 189–90.
- 57 Chōng Tojōn, ”Sambong Chip”, lainattu teoksessa P. Lee ja W. de Bary (toim.), *Sources of Korean Tradition*, vol. 1: *From Early Times through the Sixteenth Century* (New York, 1997), 328.
- 58 Kuningas Sejong, ”Sejong silip”, ibid., 331.
- 59 Ung Qua, ”Bing Ngo dai cao”, lainattu teoksessa G. Dutton, J. Werner ja J. Whitmore (toim.), *Sources of Vietnamese Tradition* (New York, 2012), 93.
- 60 N. Huy ja T. Tai, *The Lê Code*, 2 vols (Athens, OH, 1987), 1, 98–9.
- 61 L. Jardine, *Worldly Goods* (Lontoo, 1996), 14–17.
- 62 Barbier, *Emergence of the World Economy*, 165–6.
- 63 E. Hobsbawm, *Industry and Empire: From 1750 to the Present Day* (Lontoo, 1968).
- 64 F. Trentmann, *Empire of Things: How We Became a World of Consumers, from the Fifteenth Century to the Twenty-First* (Lontoo, 2016), 23–4.
- 65 C. Glacken, *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century* (Berkeley, 1967), 338.
- 66 Grove, *Green Imperialism*, 26.

- 67 P. Warde, *The Invention of Sustainability: Nature and Destiny, c.1500–1870* (Cambridge, 2018), 80, 67–8.
- 68 J. Richards, *The Unending Frontier: An Environmental History of the Early Modern World* (Berkeley, 2003), 25.
- 69 A. Murali, "Whose Trees? Forest Practices and Local Communities in Andhra, 1600–1922", teoksessa Arnold ja Guha (toim.), *Nature, Culture, Imperialism*, 88–9.
- 70 A. Massing, "Mapping the Malagueta coast: A history of the Lower Guinea Coast, 1460–1510, through Portuguese maps and accounts", *History in Africa* 36 (2009), 331–65.
- 71 P. Freedman, *Out of the East: Spices and the Medieval Imagination* (New Haven, 2008), 195–6.
- 72 W. Phillips ja C. Rahn Phillips, *Worlds of Christopher Columbus* (Cambridge, 1992); F. Fernández-Armesto, *1492: The Year the World Began* (Lontoo, 2010).
- 73 *The Four Voyages of Columbus*, toim. ja käänt. J. Cohen (Lontoo, 1969), 117.
- 74 Ibid., 79–80.
- 75 Ibid., 67.
- 76 L. Collingham, *The Hungry Empire: How Britain's Quest for Food Shaped the Modern World* (Lontoo, 2017), 6–7.
- 77 J. de Acosta, *Natural and Moral History of the Indies*, toim. J. Mangan, käänt. F. López-Morillas (Durham, NC, 2002), 89; S. White, "Unpuzzling American Climate: New World Experience and the Foundations of a New Science", *Isis* 106 (2015), 550.
- 78 B. Cobo, *Obras del Padre Bernabé Cobo*, toim. F. Mateos (Madrid, 1964), 55; White, "Unpuzzling American Climate", 550.
- 79 Ks. S. White, *A Cold Welcome: The Little Ice Age and Europe's Encounter with North America* (Cambridge, MA, 2017), 9–11.
- 80 R. Eden, *The Decades of the Neue Worlde of West India*, teoksessa E. Arber (toim.), *The First Three English Books on America* (Birmingham, 1885), 87, 104; J. Chaplin, "Natural Philosophy and an Early Racial Idiom in North America: Comparing English and Indian Bodies", *William and Mary Quarterly* 54 (1997), 239.
- 81 W. Bradford, *Of Plymouth Plantation, 1620–1647*, toim. S. Morison (New York, 1953), 26, 14; Chaplin, "Natural Philosophy and an Early Racial Idiom", 239.
- 82 Chaplin, "Natural Philosophy and an Early Racial Idiom", 239.

- 83 Comte de Buffon, *Buffon's Natural History, Containing a Theory of the Earth, a General History of Man, of the Brute Creation and of Vegetables, Minerals &c. &c.*, 10 vols (Lontoo, 1910), 9, 86.
- 84 G. Raynal, *Histoire philosophique et politique des établissements et du commerce des Européens dans les deux Indes* (Pariisi, 1780).
- 85 Buffon, *Buffon's Natural History*, 4, 332–3.
- 86 L. Dugatkin, "Buffon, Jefferson and the theory of New World degeneracy", *Evolution: Education and Outreach* 12 (2019), 1–8.
- 87 Jefferson, *Notes on the State of Virginia*, 64.
- 88 D. Eltis, *The Rise of African Slavery in the Americas* (Cambridge, 2012), 143.
- 89 W. Beinart ja L. Hughes, *Environment and Empire* (Oxford, 2020), 27.
- 90 A. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (Cambridge, 1986), 138–9.
- 91 H. French, *Born in Blackness: Africa, Africans, and the Making of the Modern World, 1471 to the Second World War* (New York, 2021), 113–15.
- 92 Beinart ja Hughes, *Environment and Empire*, 29–30; ks. myös P. Lovejoy, *Transformations in Slavery: A History of Slavery in Africa* (Cambridge, 2012), 37–44.
- 93 Eltis, *Rise of African Slavery*, 148.

UUDEN JA VANHAN MAAILMAN SULAUTUMINEN

- 1 N. Nunn ja N. Qian, "The Columbian Exchange: A History of Disease, Food, and Ideas", *Journal of Economic Perspectives* 24 (2010), 163–88.
- 2 J. de Vries, "The Industrial Revolution and the Industrious Revolution", *Journal of Economic History* 54.2 (1994), 249–70; J. van Zanden, "The 'Revolt of the Early Modernists' and the 'First Modern Economy': An Assessment", *Economic History Review* 55 (2002), 619–41.
- 3 S. Beckert et al., "Commodity frontiers and the transformation of the global countryside: a research agenda", *Journal of Global History* 16 (2021), 435–6.
- 4 D. Acemoglu, S. Johnson ja J. Robinson, "The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth", *American Economic Review* 95 (2005), 546–79.
- 5 A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, 2 vols (Lontoo, 1961), 2, 161. Suomentanut Jaakko Kankaanpää: *Kansojen varallisuus*, WSOY 2015.
- 6 Acemoglu, Johnson ja Robinson, "Rise of Europe", 546–79.

- 7 J. van Zanden, E. Buringh ja M. Bosker, "The rise and decline of European parliaments, 1188–1789", *Economic History Review* 65 (2011), 835–61.
- 8 C. Álvarez-Nogal ja L. de la Escosura, "The rise and fall of Spain (1270–1850)", *Economic History Review* 66 (2013), 1–37; A. Henriques ja N. Palma, "Comparative European Institutions and the Little Divergence, 1385–1800", Centre for Economic Policy Research, Discussion Paper 14124 (2019).
- 9 H. Thomas, *Conquest: Montezuma, Cortés and the Fall of Old Mexico* (Lontoo, 1993); K. MacQuarrie, *The Last Days of the Incas* (Lontoo, 2007).
- 10 A. Reséndez, *A Land So Strange: The Epic Journey of Cabeza de Vaca* (New York, 2007), 25.
- 11 R. Pike, "Seville in the Sixteenth Century", *Hispanic American Historical Review* 41.1 (1961), 6, 12–13.
- 12 H. Cross, "South American Bullion Production and Export, 1550–1750", teoksessa J. Richards (toim.), *Precious Metals in the Later Medieval and Early Modern Worlds* (Durham, NC, 1983), 402–4.
- 13 O. Dunn ja J. Kelley (toim. ja käät.), *The Diario of Christopher Columbus's First Voyage to America, 1492–3* (Norman, OK, 1989), 235–7.
- 14 A. Reséndez, *Other Slavery: The Uncovered Story of Indian Enslavement in America* (New York, 2016), 324.
- 15 N. Van Deusen, *Global Indios: The Indigenous Struggle for Justice in Sixteenth-Century Spain* (Durham, NC, 2015), 2.
- 16 Ibid., 3.
- 17 L. Paravisini-Gebert, "Food, Biodiversity, Extinctions: Caribbean Fauna and the Struggle for Food Security during the Conquest of the New World", *Journal of West Indian Literature* 24 (2016), 12–13.
- 18 Ibid., 14.
- 19 E. Melville, *A Plague of Sheep: Environmental Consequences of the Conquest of Mexico* (Cambridge, 1994), 99–102.
- 20 Crosby, *Ecological Imperialism*, 159.
- 21 Ibid., 1.
- 22 R. McCaa, "Spanish and Nahuatl Views on Smallpox and Demographic Catastrophe in Mexico", *Journal of Interdisciplinary History* 25 (1995), 397–431; Crosby, *Columbian Exchange*; N. Cook, *Born to Die: Disease and New World Conquest, 1492–1650* (Cambridge, 1998), 15–59.
- 23 C. Warriner et al., "Disease, Demography, and Diet in Early Colonial New Spain: Investigation of a Sixteenth-Century Mixtec Cemetery at Teposcolula Yucundaa", *Latin American Quarterly* 23 (2012), 467–89.

- 24 Å. Vågene, "Salmonella enterica genomes from victims of a major sixteenth-century epidemic in Mexico", *Nature Ecology & Evolution* 2 (2018), 520–8.
- 25 R. Herzog, "How Aztecs reacted to Colonial Epidemics", *JSTOR Daily*, 23.9.2020.
- 26 F. de Torquemada, *Monarquia Indiana*, 7 vols (Mexico City, 1969), 5, 642–3.
- 27 R. Acuña-Soto, L. Calderon Romero ja J. Maguire, "Large epidemics of Hemorrhagic Fevers in Mexico, 1545–1815", *American Journal of Tropical Medicine and Hygiene* 62 (2000), 733–4.
- 28 F. Cervantes, *The Devil in the New World: The Impact of Diabolism in New Spain* (New Haven, 1997).
- 29 H. Cagle, *Assembling the Tropics: Science and Medicine in Portugal's Empire, 1450–1700* (Cambridge, 2018), 169–207.
- 30 Bartolomé de las Casas, *Historia de las Indias*, teoksessa P. Sullivan (toim. ja käät.), *Indian Freedom: The Cause of Bartolomé de las Casas, 1484–1566: A Reader* (Kansas City, 1995), 3.29, 146.
- 31 G. Icazbalceta, *Códice Mendieta: documentos franciscanos, siglos XVI y XVII*, 2 vols (Guadalajara, Mexico, 1971), 1, 26–7; 245.
- 32 C. Riley, *The Kachina and the Cross: Indians and Spaniards in the Early Southwest* (Salt Lake City, UT, 1999), 52, 60.
- 33 R. Flint (toim.), *Great Cruelties Have Been Reported: The 1544 Investigation of the Coronado Expedition* (Dallas, 2002), 250–69.
- 34 S. White, "Cold, Drought, and Disaster: The Little Ice Age and the Spanish Conquest of New Mexico", *New Mexico Historical Review* 89 (2014), 425–58.
- 35 S. White, "North American Climate History (1500–1800)", teoksessa White, Pfister ja Mauelshagen (toim.), *Palgrave Handbook of Climate History*, 302.
- 36 White, *Cold Welcome*, 57–8.
- 37 Ibid., 75–7.
- 38 Ibid., 62.
- 39 A. Lawler, *The Secret Token: Myth, Obsession, and the Search for the Lost Colony of Roanoke* (New York, 2018).
- 40 White, *Cold Welcome*, 62.
- 41 W. Fitzgerald, "Contact, Neural Iroquoian Transformation, and the Little Ice Age", teoksessa D. Brose et al. (toim.), *Societies in Eclipse: Archaeology of the Eastern Woodland Indians, AD 1400–1700* (Washington, DC, 2012), 37–48.

- 42 J. Rice, *Nature and History in the Potomac Country: From Hunter-Gatherers to the Age of Jefferson* (Baltimore, 2009), 26–71.
- 43 S. Potter, *Commoners, Tribute, and Chiefs: The Development of Algonquian Culture in the Potomac Valley* (Charlottesville, VA, 1993), 165–8; S. White, "'Shewing the difference betweene their conjuration, and our invocation on the name of God for rayne': Weather, Prayer, and Magic in Early American Encounters", *William and Mary Quarterly* 72 (2015), 45–6.
- 44 Ks. T. Wickham, "Narrating Indigenous Histories of Climate Change in the Americas and Pacific", teoksessa White, Pfister ja Maelshagen (toim.), *Palgrave Handbook of Climate History*, 390–2.
- 45 Ks. esim. S. Sabol, "*The Touch of Civilization*": Comparing American and Russian Internal Colonization (Boulder, CO, 2017).
- 46 D. Jones, "Virgin Soils Revisited", *William and Mary Quarterly* 60 (2003), 703–42.
- 47 Townsend, *Fifth Sun*, 11–12.
- 48 M. Rubino, "Low atmospheric CO₂ levels during the Little Ice Age due to cooling-induced terrestrial uptake", *Nature Geoscience* 9 (2016), 691–4; A. Koch et al., "Earth system impacts of the European arrival and Great Dying in the Americas after 1492", *Quaternary Science Reviews* 207 (2019), 13–36.
- 49 Koch et al., "Earth system impacts", 13.
- 50 D. Degroot, "Climate change and society in the 15th to 18th centuries", *WIREs Climate Change* 9 (2018), 10.
- 51 P. Mancall ja T. Weiss, "Was Economic Growth Likely in Colonial British North America?", *Journal of Economic History* 59 (1999), 17–40.
- 52 Richards, *Unending Frontier*, 389.
- 53 Ibid., 391–2; ks. myös J. Hemming, *Red Gold: The Conquest of the Brazilian Indians* (Lontoo, 1978), 143–5.
- 54 Hemming, *Red Gold*, 144.
- 55 P. Kelton, *Epidemics and Enslavement: Biological Catastrophe in the Native Southeast, 1492–1715* (Lincoln, NB, 2007), 76–7.
- 56 P. Curtin, *The Rise and Fall of the Plantation Complex: Essays in Atlantic History* (Cambridge, 1990).
- 57 D. Eltis, *The Rise of African Slavery in the Americas* (Cambridge, 2000), 57ff.
- 58 Lainattu teoksessa A. Mikhail, *God's Shadow: Sultan Selim, his Ottoman Empire, and the Making of the Modern World* (New York, 2020), 151–2.
- 59 J. Borja, "Barbarización y redes de endoctrinamiento en los negros: cosmovisiones en Cartagena, siglos XVII y XVIII", teoksessa A.

- Ulloa (toim.), *Contribución africana a la cultura de las Américas* (Bogotá, 1992), 249.
- 60 S. Diouf, *Servants of Allah: African Muslims Enslaved in the Americas*, 15th anniversary edn (New York, 2013), 35–6.
- 61 Ibid., 210–11.
- 62 Ibid., 36–7, 210–50.
- 63 J. Montaño, *The Roots of English Colonialism in Ireland* (Cambridge, 2011), 18; Collingham, *Hungry Empire*, 17–22.
- 64 G. Milton, *Big Chief Elizabeth: The Adventures and Fate of the First English Colonists in America* (Lontoo, 2000).
- 65 N. Matar, *Turks, Moors, and Englishmen in the Age of Discovery* (New York, 1999), 92.
- 66 F. Thorpe, *The Federal and State Constitutions: Colonial Charters, and Other Organic Laws of the States, Territories, and Colonies, Now or Heretofore Forming the United States of America*, 7 vols (Washington, DC, 1909), 3, 1828–9.
- 67 J. Marr ja J. Cathey, "New Hypothesis for Cause of Epidemic among Native Americans, New England, 1616–1619", *Emerging Infectious Diseases* 16 (2010), 281–6.
- 68 P. Mancall, *Nature and Culture in the Early Modern Atlantic* (Philadelphia, 2017).
- 69 A. Zilberstein, *A Temperate Empire: Making Climate Change in Early America* (Oxford, 2016), 97–8.
- 70 Ibid., 98.
- 71 D. Galenson, *White Servitude in Colonial America: An Economic Analysis* (Cambridge, 1981); S. Salinger, "Labor, Markets, and Opportunity: Indentured Servitude in Early America", *Labor History* 38 (1997), 311–38.
- 72 M. Parker, *The Sugar Barons: Family, Corruption and War in the West Indies* (Lontoo, 2011).
- 73 Collingham, *Hungry Empire*, 49–50; Ranskasta ks. P. Boucher, *France and the American Tropics to 1700: Tropics of Discontent?* (Baltimore, 2008).
- 74 F. Bacon, "Of Plantations", teoksessa S. Reynolds, *The Essays or Counsels, Civil and Moral of Francis Bacon* (Oxford, 1890), 237; D. Souden, "'Rogues, Whores and Vagabonds'? Indentured Servant Emigrants to North America and the Case of Mid-Seventeenth Century Bristol", *Social History* 3 (1978), 23–41.
- 75 R. Hakluyt, *The Original Writings and Correspondence of the Two Richard Hakluyts* (Lontoo, 1935), 317–19.

- 76 H. Beckles, "The Hub of Empire: The Caribbean and Britain in the Seventeenth Century", teoksessa N. Canny (toim.), *The Oxford History of the British Empire*, vol. 1: *The Origins of Empire: British Overseas Enterprise to the Close of the Seventeenth Century* (Oxford, 1998), 222–3.
- 77 H. Beckles, *White Servitude and Black Slavery in Barbados, 1627–1715* (Knoxville, TN, 1989), 59–79.
- 78 Beinart ja Hughes, *Environment and Empire*, 34.
- 79 Beckles, "Hub of Empire", 232.
- 80 J. Thornton, *Africa and Africans in the Making of the Atlantic World, 1400–1600* (Cambridge, 1992), 134–6; J. García Zaldúa ja D. Hosler, "Copper Smelting at the Archaeological Site of El Manchón, Guerrero: From Indigenous Practice to Colonial-Scale Production", *Latin American Antiquity* 31 (2020), 558–75; L. Gragg, *Englishmen Transplanted: The English Colonization of Barbados, 1627–1660* (Oxford, 2003), 19–20.
- 81 C. Gardina Pestana, *The English Conquest of Jamaica: Oliver Cromwell's Bid for Empire* (New York, 2017).
- 82 B. Higman, *Concise History of the Caribbean* (Cambridge, 2011), 64–80.
- 83 C. Palmer, *Slaves of the White God: Blacks in Mexico, 1570–1650* (Cambridge, MA, 1976), 69–70.
- 84 T. Burnard, "'The Countrie Continues Sicklie': White Mortality in Jamaica, 1655–1780", *Social History of Medicine* 12 (1999), 45–72.
- 85 M. Espinosa, "The Question of Racial Immunity to Yellow Fever in History and Historiography", *Social Science History* 38 (2014), 437–53.
- 86 J. Powell, A. Gloria-Soria ja P. Kotsakiozi, "Recent History of *Aedes aegypti*: Vector Genomics and Epidemiology Records", *BioScience* 68 (2018), 854–60; J.-P. Chippaux ja A. Chippaux, "Yellow fever in Africa and the Americas: a historical and epidemiological perspective", *Journal of Venomous Animals and Toxins Including Tropical Diseases* 24 (2018), 1–14.
- 87 J. McNeil, *Ecology and War in the Greater Caribbean, 1620–1914* (Cambridge, 2010).
- 88 Beinart ja Hughes, *Environment and Empire*, 23.
- 89 K. Kiple ja B. Higgins, "Yellow Fever and the Africanization of the Caribbean", teoksessa J. Verano ja D. Uberlaker (toim.), *Disease and Demography in the Americas* (Washington, DC, 1992), 237–48.

LUONNON JA IHMISTEN RIISTÄMISESTÄ

- 1 W. Pettigrew, *A Freedom's Debt: The Royal African Company and the Politics of the Atlantic Slave Trade* (Chapel Hill, NC, 2014).

- 2 D. Eltis ja L. Jennings, "Trade between Western Africa and the Atlantic World in the Pre-Colonial Era", *American Historical Review* 93 (1988), 944.
- 3 L. Gragg, "'To procure Negroes': The English slave trade to Barbados, 1627–60", *Slavery and Abolition: A Journal of Slave and Post-Slave Studies* 16 (1995), 65.
- 4 M. Rediker, *The Slave Ship: A Human History* (New York, 2007), 291–301.
- 5 R. Davis, *The Rise of the English Shipping Industry in the Seventeenth and Eighteenth Centuries* (Oxford, 2017), 373–4.
- 6 Lovejoy, *Transformations in Slavery*, 48.
- 7 A. de Pleijt ja J. van Zanden, "Accounting for the 'Little Divergence': What drove economic growth in pre-industrial Europe, 1300–1800?", *European Review of Economic History* 20 (2016), 387–409; Gragg, "'To procure Negroes'", 65.
- 8 Davis, *Rise of the English Shipping Industry*, 374.
- 9 H. Raynes, *A History of British Insurance* (Lontoo, 1948).
- 10 H. Beckles, "The Economic Origins of Black Slavery in the British West Indies, 1640–1680: A Tentative Analysis of the Barbados Model", *Journal of Caribbean History* (1982), 16, 52–3; H. Beckles ja A. Downes, "The Economics of Transition to the Black Labor System in Barbados", *Journal of Interdisciplinary History* (1987) 37, 225–47.
- 11 A. Hochschild, *Bury the Chains: The British Struggle to Abolish Slavery* (Lontoo, 2005), 65–8.
- 12 Ibid., 67.
- 13 J. Krikler, "A Chain of Murder in the Slave Trade: A Wider Context of the Zong Massacre", *International Review of Social History* 57 (2012), 402–3.
- 14 H. Klein ja S. Engerman, "Long-Term Trends in African Mortality in the Transatlantic Slave Trade", *Slavery and Abolition* 18 (1997), 40–4.
- 15 Krikler, "Chain of Murder in the Slave Trade", 410–11.
- 16 Hochschild, *Bury the Chains*, 22.
- 17 N. Rodger, "War as Economic Activity in the 'Long' Eighteenth Century", *International Journal of Maritime History* 22 (2010), 1–18.
- 18 F. Arteaga, D. Desierto ja M. Koyama, "Shipwrecked by Rents", Centre for Economic Policy Research, Discussion Paper DP15300 (2020), 1–50.
- 19 "The First Voyage of the right worshipfull and valiant knight, Sir John Hawkins", teoksessa C. Markham (toim.), *The Hawkins Voyages* (Lontoo, 1878), 5. Ks. myös H. Kelsey, *Sir John Hawkins: Queen Elizabeth's Slave Trader* (New Haven, 2003), 52–69.

- 20 Ks. esim. G. Heng, *The Invention of Race in the European Middle Ages* (Cambridge, 2018).
- 21 Herodotos, *The Histories (Historiae)*, 9.122, 589–90.
- 22 Montesquieu, *The Spirit of the Laws*, toim. A. Cohler, B. Miller ja H. Stone (Cambridge, 1998), 14, 231–2, 235.
- 23 Ibid., 233.
- 24 Ibid., 243–4.
- 25 Ibid., 17, 278.
- 26 Krikler, "Chain of Murder in the Slave Trade", 414.
- 27 W. Wiecek, *The Sources of Antislavery Constitutionalism in America, 1760–1848* (Ithaca, NY, 1977), 24.
- 28 J. Krikler, "The Zong and the Lord Chief Justice", *History Workshop Journal* 64 (2007), 36.
- 29 Ks. esim. M. Dresser ja A. Hann (toim.), *Slavery and the British Country House* (Lontoo, 2013).
- 30 Krikler, "The Zong and the Lord Chief Justice", 33.
- 31 French, *Born in Blackness*, 124, 190.
- 32 Krikler, "Chain of Murder in the Slave Trade", 409–10.
- 33 Gomes Eanes de Zuara, *Crónica de Guiné*, teoksessa C. Beazley ja E. Prestage (toim. ja käännt.), *The Chronicle of the Discovery and Conquest of Guinea*, 2 vols (Lontoo, 1896–9), 1, 81–2.
- 34 Vincent Brown, *Tacky's Revolt: The Story of an Atlantic Slave War* (Cambridge, MA, 2020), 57.
- 35 Ibid., 58.
- 36 Lainattu teoksessa B. Philips, *Loot: Britain and the Benin Bronzes* (Lontoo, 2021), 52.
- 37 Krikler, "Chain of Murder in the Slave Trade", 407.
- 38 Ibid., 398, 401.
- 39 Collingham, *Hungry Empire*, 43.
- 40 K. Davies, *Royal African Company* (Lontoo, 1957), 299.
- 41 Beinart ja Hughes, *Environment and Empire*, 28–9.
- 42 E. Esposito, "Side Effects of Immunity: The Rise of African Slavery in the US South", *Cahiers de Recherches Économiques du Département d'Économie* (2018), 3–5.
- 43 E. Yalcindag et al., "Multiple independent introductions of *Plasmodium falciparum* in South America", *PNAS* 109 (2012), 511–16.
- 44 F. Cambournac, "Contribution to the history of malaria epidemiology and control in Portugal and some other places", *Parassitologia* 36 (1994), 215–22.

- 45 J. Taylor et al., "The evolutionary history of *Plasmodium vivax* as inferred from mitochondrial genomes: parasite genetic diversity in the Americas", *Molecular Biology Evolution* 30 (2013), 2050–64. Ks. P. Rodrigues et al., "Human migration and the spread of malaria parasites to the New World", *Scientific Reports* 8 (2018), 1–13.
- 46 Esposito, "Side Effects of Immunity", 20, 9.
- 47 Grove, "El Niño Chronology and the Little Ice Age", 58–9; M. Amoroso et al., "South American dendroecological field week 2016: exploring dendrochronological research in Northern Patagonia", *Tree Ring Research* 74 (2018), 120–31.
- 48 Esposito, "Side Effects of Immunity", 7–10.
- 49 M. Humphreys, *Malaria: Poverty, Race and Public Health in the United States* (Baltimore, 2003).
- 50 D. Brown ja C. Webb, *Race in the American South: From Slavery to Civil Rights* (Edinburgh, 2007), 28–31.
- 51 Esposito, "Side Effects of Immunity", 33.
- 52 Ibid., 18–19, 26; W. Wiecek, "The statutory law of slavery and race in the thirteen mainland colonies of British America", *William and Mary Quarterly* (1977), 258–80.
- 53 J. Morgan, "Partus sequitur ventrem: law, race, and reproduction in colonial slavery", *Small Axe* 22 (2018), 1–17.
- 54 M. Schwartz, *Birthing a Slave: Motherhood and Medicine in the Antebellum South* (Cambridge, MA, 2006).
- 55 R. Steckel, "A Dreadful Childhood: The Excess Mortality of American Slaves", *Social Science History* 10 (1986), 427–65.
- 56 D. Owens, *Medical Bondage: Race, Gender, and the Origins of American Gynecology* (Athens, GA, 2017).
- 57 D. Cooper Owens ja S. Fett, "Black Maternal and Infant Health: Historical Legacies of Slavery", *American Journal of Public Health* 109 (2019), 1342–5.
- 58 R. Packard, *The Making of a Tropical Disease: A Short History of Malaria* (Baltimore, 2007), 53–66; J. McNeill, "Ecology, Epidemics and Empires: Environmental Change and the Geopolitics of Tropical America", *Environment and History* 5 (1999), 177–9.
- 59 A. Acharya, M. Blackwell ja M. Sen, "The Political Legacy of American Slavery", *Journal of Politics* 78 (2016), 621–41.
- 60 J. Hersh ja H.-J. Voth, "Sweet Diversity: Colonial Goods and the Welfare Gains from Trade after 1492", CEPR Working Paper (2011), 1.
- 61 M. Mulcahy, *Hubs of Empire: The Southeastern Lowcountry and British Caribbean* (Baltimore, 2014), 103, 82, 46.

- 62 G. Beer, *British Colonial Policy, 1754–65* (New York, 1907), 144.
- 63 R. Naylor, *Canada in the European Age, 1453–1919* (Montreal, 2006), 121.
- 64 Brown, *Tacky's Revolt*, 76.
- 65 P. Gauci, *William Beckford: First Prime Minister of the London Empire* (New Haven, 2013), 96.
- 66 Ibid., 91.
- 67 J. de Vries, "The Industrial Revolution and the Industrious Revolution", 249–70; van Zanden, "The 'Revolt of the Early Modernists' and the 'First Modern Economy'", 619–41; R. Allen, *The British Industrial Revolution in Global Perspective* (Cambridge, 2009), 1–22.
- 68 J. de Vries, "Between Purchasing Power and the World of Goods: Understanding the Household Economy in Early Modern Europe", teoksessa J. Brewer ja R. Porter (toim.), *Consumption and the World of Goods* (Lontoo, 1993), 85–132; H.-J. Voth, "Time and Work in Eighteenth-Century London", *Journal of Economic History* 58 (1998), 29–58.
- 69 Hersch ja Voth, "Sweet Diversity", 1–52.
- 70 F. Braudel, *Civilisation and Capitalism, 15th–18th Century*, 3 vols (Lontoo, 1981–5), 130; R. Sheridan, *Sugar and Slavery* (Barbados, 1974), 21.
- 71 Hersh ja Voth, "Sweet Diversity", 21–2; Nunn ja Qian, "The Columbian Exchange", 178.
- 72 Beinart ja Hughes, *Environment and Empire*, 25.
- 73 J. Mokyr, "Is There Still Life in the Pessimist Case? Consumption during the Industrial Revolution, 1790–1850", *Journal of Economic History* 48 (1988), 69–92.
- 74 G. Faulconbridge, "British 'Treasure Island' tax havens face a tempest", Reuters, 7.6.2021.
- 75 J. Lovell, *The Opium War: Drugs, Dreams and the Making of China* (Lontoo, 2011).
- 76 Ks. esim. Z. Wang, *Never Forget National Humiliation: Historical Memory in Chinese Politics and Foreign Relations* (New York, 2014).
- 77 Braudel, *Civilisation and Capitalism*, 1, 258.
- 78 B. Cowan, *The Social Life of Coffee: The Emergence of the British Coffeehouse* (New Haven, 2005); J. van Horn Melton, *The Rise of the Public in Enlightenment Europe* (Cambridge, 2001), tunnetuimpana J. Habermas, *Strukturwandel der Öffentlichkeit. Untersuchungen zu einer Kategorie der bürgerlichen Gesellschaft* (Berliini, 1962).

- 79 Klassikkotutkimus on Hobsbawm, *Industry and Empire*; ks. myös S. Mintz, *Sweetness and Power: The Place of Sugar in Modern History* (New York, 1986).
- 80 S. Beckert, *Empire of Cotton: A Global History* (New York, 2014), 63.
- 81 Ibid., 98–106.
- 82 D. Watts, "Cycles of Famine in Islands of Plenty", teoksessa B. Currey ja G. Hugo (toim.), *Famine as a Geographical Phenomenon* (Dordrecht, 1984), 62. Ks. myös J. Weaver, *The Great Land Rush and the Making of the Modern World, 1650–1900* (Montreal, 2003).
- 83 D. Watts, *The West Indies: Patterns of Development, Culture and Environmental Change since 1492* (Cambridge, 1987), 397.
- 84 E. Williams, *Capitalism and Slavery* (Lontoo, 1944).
- 85 M. Mulcahy, *Hurricanes and Society in the British Greater Caribbean, 1624–1783* (Baltimore, 2006); S. Schwartz, *Sea of Storms: A History of Hurricanes in the Greater Caribbean to Katrina* (Princeton, 2015).
- 86 K. Douglass ja J. Cooper, "Archaeology, environmental justice, and climate change on islands in the Caribbean and southwestern Indian Ocean", *PNAS* 117 (2020), 8254–62.
- 87 Pomeranz, *The Great Divergence*, 211ff.
- 88 A. Carlos ja F. Lewis, *Commerce by a Frozen Sea. Native Americans and the European Fur Trade* (Philadelphia, 2010), 22–6.
- 89 V. Hyden-Hanscho, "Invisible Globalization: French Hats in Habsburg Vienna, 1650–1750", *Journal of European Economic History* 45 (2016), 11–54. Ks. myös M. Francis, "The Strange Career of the Canadian Beaver: Anthropomorphic Discourses and Imperial History", *Journal of Historical Sociology* 17 (2004), 202–32.
- 90 Ks. esim. E. Dolin, *Leviathan: The History of Whaling in America* (New York, 2007).
- 91 J. Jackson, *The Thief at the End of the World: Rubber, Power and the Seeds of Empire* (New York, 2008).
- 92 Ks. J. Miller, *Way of Death: Merchant Capitalism and the Angolan Slave Trade, 1730–1830* (Lontoo, 1988); Klein ja Engerman, "Long-Term Trends in African Mortality", 36–48.
- 93 S. Behrendt, "Ecology, Seasonality, and the Transatlantic Slave Trade", teoksessa B. Bailyn ja P. Denault (toim.), *Soundings in Atlantic History: Latent Structures and Intellectual Currents, 1500–1830* (Cambridge, 2009), 44–85.
- 94 J. Fenske ja N. Kala, "Climate and the slave trade", *Journal of Development Economics* 112 (2015), 19–32.
- 95 C. Wilder, *Ebony and Ivy: Race, Slavery, and the Troubled History of America's Universities* (New York, 2013).

- 96 J. Weil, "More than 1700 congressmen once enslaved Black People", *Washington Post*, 10.1.2021.
- 97 Lainattu teoksessa Collingham, *Hungry Empire*, 49.
- 98 Lainattu teoksessa Brown, *Tacky's Revolt*, 27.
- 99 P. Earle, *The World of Defoe* (New York, 1977); V. Brown, *The Reaper's Garden: Death and Power in the World of Atlantic Slavery* (Cambridge, MA, 2008), 24.
- 100 J. Holcomb, *Moral Commerce: Quakers and the Transatlantic Boycott of the Slave Labor Economy* (Ithaca, NY, 2016), 33.
- 101 J. Holcomb, "Rejecting the Gain of Oppression: Quaker Abstention and the Abolitionist Cause", teoksessa M. Jackson ja S. Kozel (toim.), *Quakers and their Allies in the Abolitionist Cause, 1754–1808* (Abingdon, 2015), 99–110.
- 102 R. Hall ja C. Jones, "Why Do Some Countries Produce So Much More Output Per Worker Than Others?", *Quarterly Journal of Economics* 114 (1999), 83–116.
- 103 Belich, *The World the Plague Made*, 281.
- 104 P. Manning, *Slavery and African Life: Occidental, Oriental, and African Slave Trades* (Cambridge, 1990), 60–85.
- 105 W. Whatley ja R. Gillezeau, "The fundamental impact of the slave trade on African economies", teoksessa P. Rhode, J. Rosenbloom ja D. Weiman (toim.), *Economic Evolution and Revolution in Historical Time* (Stanford, 2011), 86–110.
- 106 G. Ugo Nwokeji, *The Slave Trade and Culture in the Bight of Biafra: An African Society in the Atlantic World* (Cambridge, 2010), 117–43.
- 107 Lovejoy, *Transformations in Slavery*, 106–11; W. Hawthorne, "The Production of Slaves Where There Was No State: The Guinea-Bissau Region, 1450–1815", *Slavery & Abolition*, 20 (1999), 97–124.
- 108 Brown, *Tacky's Revolt*, 22–5; W. Richards, "The Import of Firearms into West Africa in the Eighteenth Century", *Journal of African History* 21 (1980), 43–59.
- 109 N. Nunn, "The long-term effects of Africa's slave trades", *Quarterly Journal of Economics* 123 (2008), 139–76.
- 110 N. Nunn ja L. Wantchekon, "The slave trade and the origins of mistrust in Africa", *American Economic Review* 101 (2011), 3221–52.
- 111 W. Whatley ja R. Gillezeau, "The Impact of the Transatlantic Slave Trade on Ethnic Stratification in Africa", *American Economic Review* 101 (2010), 571–6.
- 112 H. Thomas, *The Story of the Atlantic Slave Trade: 1440–1870* (New York, 1997), 810–11.

- 113 G. Ugo Nwokeji, "African Conceptions of Gender and the Slave Traffic", *William and Mary Quarterly* 58 (2001), 47–68.
- 114 K. Wood, "Gender and Slavery", teoksessa M. Smith ja R. Paquette (toim.), *The Oxford Handbook of Slavery in the Americas* (Oxford, 2010), 515–17.
- 115 E. Baptist, "'Cuffy,' 'Fancy Maids,' and 'One-Eyed Men': Rape, Commodification, and the Domestic Slave Trade in the United States", *American Historical Review* 106 (2001), 1619–50; M. Smith (toim.), *Sex without Consent: Rape and Sexual Coercion in America* (New York, 2001).
- 116 Wood, "Gender and Slavery", 518–19.
- 117 D. Berry, "*Swing the Sickle for the Harvest is Ripe*: Gender and Slavery in Antebellum Georgia (Chicago, 2007), 35–51 and *passim*.
- 118 J. Dalton ja T. Leung, "Why Is Polygyny More Prevalent in Western Africa? An African Slave Trade Perspective", *Economic Development and Cultural Change* 62 (2014), 599–632.
- 119 J. Fenske, "African polygamy: Past and present", *Journal of Development Economics* 117 (2015), 58–73.
- 120 M. Tertilt, "Polygyny, Fertility, and Savings", *Journal of Political Economy* 113(6) (2005), 1341–71; M. Tertilt, "Polygyny, Women's Rights, and Development", *Journal of the European Economic Association* 4 (2006), 523–30.
- 121 G. Bertocchi ja A. Dimico, "The long-term determinants of female HIV infection in Africa: The slave trade, polygyny, and sexual behavior", *Journal of Development Economics* 140 (2019), 90–105.
- 122 L. Walters, C. Chisadza ja M. Chance, "Slave Trade and Women Political Participation in Africa", University of Pretoria, Department of Economics Working Paper Series 56 (2021), 1–34.
- 123 J. Locke, *Second Treatise of Government and A Letter Concerning Toleration*, toim. M. Goldie (Oxford, 2016), 5, 15–16. Suomentanut Mikko Yrjönsuuri: *Tutkielma hallitusvallasta*, Gaudeamus 1995.
- 124 S. Stoddard, *An Answer to Some Cases of Conscience Respecting the Country* (1722).
- 125 Y. Hale Hendlin, "From Terra Nullius to Terra Communis", *Environmental Philosophy* 11 (2014), 141–74.
- 126 G. Chakraborty, "Roots and Ramifications of a Colonial 'Construct': The Wastelands in Assam", Occasional Paper 39, Institute of Development Studies Kolkata (2012), 9–10.
- 127 C. Saunt, *Unworthy Republic: The Dispossession of Native Americans and the Road to Indian Territory* (New York, 2020).

PIENI JÄÄKAUSI

- 1 F. Matthes, "Report of Committee on Glaciers, April 1939", *Eos, Transactions, American Geophysical Union* 20 (1939), 520.
- 2 Jotkut historioitsijat ehdottavat jakson alun ajoittamista noin 1300-luvulle, esim. Miller et al., "Abrupt onset of the Little Ice Age triggered by volcanism and sustained by sea-ice/ocean feedbacks", 1–5; B. Fagan, *The Little Ice Age: How Climate Made History, 1300–1850* (New York, 2000).
- 3 J. Grove, "The Onset of the Little Ice Age", teoksessa P. Jones et al. (toim.), *History and Climate: Memories of the Future?* (Lontoo, 2001), 153–85; J. Grove, *Little Ice Ages: Ancient and Modern*, 2 vols (Lontoo, 2004).
- 4 C. Camenisch, "The 1430s: A cold period of extraordinary internal climate variability during the early Spörer Minimum with social and economic impacts in north-western and central Europe", *Climate of the Past* 12 (2016), 2107–26; J. Luterbacher, "The Late Maunder Minimum (1675–1715) – Climax of the 'Little Ice Age' in Europe", teoksessa Jones et al. (toim.), *History and Climate*, 29–54; A. Schurer, S. Tett ja G. Hegerl, "Small influence of solar variability on climate over the past millennium", *Nature Geoscience* 7 (2014), 104–8.
- 5 J. de Vries, "Histoire et climat et économie: Des faits nouveaux, une interprétation différente", *Annales Histoire, Sciences Sociales* 32 (1977), 198–226; Tarand ja Nordli, "The Tallinn Temperature Series", 360–407; L. Leijonhufvud et al., "Five Centuries of Stockholm Winter/Spring Temperatures Reconstructed from Documentary Evidence and Instrumental Observations", *Climatic Change* 101 (2010), 109–41.
- 6 F. Charpentier Ljunqvist, *Global nedkyllning: klimatet och mänsisk under 10000 år* (Tukholma, 2009).
- 7 C. Pfister et al., "Early Modern Europe", teoksessa White, Pfister ja Mauelshagen (toim.), *Palgrave Handbook of Climate History*, 268.
- 8 A. Gupta, D. Anderson ja J. Overpeck, "Abrupt changes in the Asian southwest monsoon during the Holocene and their links to the North Atlantic Ocean", *Nature* 421 (2003), 354–7; D. Oppo, Y. Rosenthal ja B. Linsley, "2,000 year-long temperature and hydrology reconstructions from the Indo-Pacific warm pool", *Nature* 460 (2009), 1113–16; W. Liu et al., "Wet climate during the 'Little Ice Age' in the arid Tarim Basin, northwestern China", *The Holocene* 21 (2010), 409–16.

- 9 J. Matthews ja K. Briffa, "The 'little ice age': re-evaluation of an evolving concept", *Geografiska Annaler: Series A, Physical Geography* 87 (2005), 17–36.
- 10 G. Parker, "Crisis and Catastrophe: Global Crisis of the 17th Century Reconsidered", *American Historical Review* 113 (2008), 1056.
- 11 G. Parker, *Global Crisis: War, Climate and Catastrophe in the Seventeenth Century* (Lontoo, 2013).
- 12 G. Eriksdotter, "Did the Little Ice Age Affect Indoor Climate and Comfort?: Re-theorizing Climate History and Architecture from the Early Modern Period", *Journal for Early Modern Cultural Studies* 13 (2013), 24–42; R.-M. Söderström, *Bostadskultur, informationsflöden och hantverkare 1740–1820 med utgångspunkt i Bålby (Närke) och Skottbergska gården (Blekinge)* (Lund, 2009).
- 13 H. Neuberger, "Climate in Art", *Weather* 25 (1970), 46–66.
- 14 Fagan, *Little Ice Age*, 48; M. Kelly ja Ó Gráda, "The Waning of the Little Ice Age: Climate Change in Early Modern Europe", *Journal of Interdisciplinary History* 44 (2014), 313.
- 15 W. Behringer, "'Kleine Eiszeit' und Frühe Neuzeit", teoksessa W. Behringer, H. Lehmann ja C. Pfister (toim.), *Kulturelle Konsequenzen der "Kleinen Eiszeit"* (Göttingen, 2005), 415–508.
- 16 W. Behringer, "Climatic Change and Witch-hunting: The Impact of the Little Ice Age on Mentalities", *Climatic Change* 43 (1999), 335–51.
- 17 B. Levack, "Introduction", teoksessa *The Oxford Handbook of Witchcraft in Early Modern Europe and Colonial America* (Oxford, 2013), 5.
- 18 E. Midelfort, *Witch Hunting in Southwestern Germany, 1562–1684* (Stanford, 1972), 201–30.
- 19 Ibid., 31–3.
- 20 A. Meier, "Natural disasters? Droughts and epidemics in pre-colonial Sudanaic Africa", *Medieval History Journal* 10 (2006), 209–36; A. Ashforth, "AIDS, Witchcraft, and the Problem of Power in Post-Apartheid South Africa", Institute for Advanced Study, Occasional Papers of the School of Social Science 10 (2001), 1–30.
- 21 W. Behringer, *Kulturgeschichte des Klimas: von der Eiszeit bis zur globalen Erwärmung* (Munich, 2007), 115–18.
- 22 C. Pfister, "Die Schwankungen des Unteren Grindelwaldgletschers im Vergleich mit historischen Witttrungsbeobachtungen und messungen", *Zeitschrift für Gletscherkunde* 11 (1976), 74–90; W. Berhringer, "Weather, Hunger and Fear: Origins of the European Witch-Hunts in Climate, Society and Mentality", *German History* 13 (1995), 1–27.

- 23 C. Pfister, "Climatic Extremes, Recurrent Crises and Witch Hunts: Strategies of European Societies in Coping with Exogenous Shocks in the Late Sixteenth and Early Seventeenth Centuries", *Medieval History Journal* 10 (2006), 33–73.
- 24 P. Malanima, "Energy crisis and growth, 1650–1850: the European deviation in a comparative perspective", *Journal of Global History* 1 (2006), 112.
- 25 H. Lee et al., "Climate change and epidemics in Chinese history: A multi-scalar analysis", *Social Science & Medicine* 174 (2017), 53–63; A. McMichael, "Insights from past millennia into climatic impacts on human health and survival", *PNAS* 109 (2012), 4730–7.
- 26 Fagan, *Little Ice Age*, 92–3, xvi; D. Degroot, "Climate Change and Conflict", teoksessa White, Pfister ja Mauelshagen (toim.), *Palgrave Handbook of Climate History*, 377–8.
- 27 N. Brown, *History and Climate Change: A Eurocentric Perspective* (Lontoo, 2001), 296.
- 28 Contribution of Working Groups I, II and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change, *Climate Change 2001: Synthesis Report* (Cambridge, 2001), 173.
- 29 Kelly ja Ó Gráda, "Waning of the Little Ice Age", 303–4.
- 30 G. Alfani, "Climate, Population and Famine in Northern Italy: General Tendencies and Malthusian Crisis, ca. 1450–1800", *Annales de Démographie Historique* 120 (2010), 24–6.
- 31 A. Ogilvie ja T. Jónsson (toim.), *Northern Research in Pursuit of a "Little Ice Age"* (Dordrecht, 2001).
- 32 J. Grove, "The Initiation of the 'Little Ice Age' in Regions round the North Atlantic", *Climatic Change* 48 (2001), 53–82.
- 33 A. Ogilvie, "Historical climatology, *Climatic Change*, and implications for climate science in the twenty-first century", *Climatic Change* 100 (2010), 33–47.
- 34 M. Owens et al., "The Maunder minimum and the Little Ice Age: an update from recent reconstructions and climate simulations", *Journal of Space Weather and Space Climate* 7 (2013), 1–10.
- 35 G. Feulner ja S. Rahmstorf, "On the effect of a new grand minimum of solar activity on the future climate on Earth", *Geophysical Research Letters* 37 (2010), 1–5; Schurer, Tett ja Hegerl, "Small influence of solar variability", 104–8.
- 36 Kelly ja Ó Gráda, "Waning of the Little Ice Age", 313–15.
- 37 D. Degroot, *The Frigid Golden Age: Climate Change, the Little Ice Age, and the Dutch Republic, 1560–1720* (Cambridge, 2018), 263–6.

- 38 *Malleus Maleficarum*, käant. M. Summers and P. Hughes (Lontoo, 1968), 6.
- 39 E. Ross, "Syphilis, Misogyny and Witchcraft in 16th-Century Europe", *Current Anthropology* 36 (1995), 333–7, N. Ben-Yehuda, "The European Witch Craze of the 14th to 17th Centuries: A Sociologist's Perspective", *American Journal of Sociology* 86 (1980), 1–31. Ks. myös E. Oster, "Witchcraft, Weather and Economic Growth in Renaissance Europe", *Journal of Economic Perspectives* 18 (2004), 215–28.
- 40 H. Trevor-Roper, *The European Witch-Craze of the 16th and 17th Centuries* (Lontoo, 1969). Psykogeenisistä sairauksista R. Bartholomew ja R. Baloh, *Havana Syndrome: Mass Psychogenic Illness and the Real Story behind the Embassy Mystery and Hysteria* (Cham, 2020).
- 41 P. Brown, "Gazing Anew at Poltava: Perspectives from the Military Revolution Controversy, Comparative History, and Decision-Making Doctrines", *Harvard Ukrainian Studies* 31 (2009), 107–33.
- 42 F. Lapointe ja R. Bradley, "Little Ice Age abruptly triggered by intrusion of Atlantic waters into the Nordic Seas", *Science Advances* 7 (2021), 1–12.
- 43 Miller et al., "Abrupt onset of the Little Ice Age triggered by volcanism and sustained by sea-ice/ocean feedbacks", 1–5; A. Condron, A. Joyce ja R. Bradley, "Arctic sea ice export as a driver of deglacial climate", *Geology* 48 (2020), 395–9.
- 44 N. Gennaioli ja H.-J. Voth, "State Capacity and Military Conflict", *Review of Economic Studies* 82 (2015), 1413–14.
- 45 G. Parker, *The Military Revolution, Military Innovation and the Rise of the West, 1500–1800* (Cambridge, 1996), 1.
- 46 Gennaioli ja Voth, "State Capacity and Military Conflict", 1412–14; H. Bowen, "The Bank of England during the Long Eighteenth Century: 1694–1820", teoksessa R. Roberts ja D. Kynaston (toim.), *The Bank of England* (Oxford, 1995), 1–18; J. Kim, "How Modern Banking Originated: The London Goldsmith-Bankers' Institutionalisation of Trust", *Business History*, 53 (2011), 939–59.
- 47 Gennaioli ja Voth, "State Capacity and Military Conflict", 1409–48.
- 48 J. Elliott, *Empires of the Atlantic World: Britain and Spain in America, 1492–1830* (New Haven, 2006), 112.
- 49 J. de Vries, "The Economic Crisis of the Seventeenth Century after Fifty Years", *Journal of Interdisciplinary History* 40 (2009), 173.
- 50 Acemoglu, Johnson ja Robinson, "Rise of Europe", 546–79.
- 51 C. McIlwain (toim.), *The Political Works of James I* (Cambridge, 1918), 343–4; Parker, *Global Crisis*, 60.

- 52 J. Evelyn, *Fumifugium; or the Inconvenience of the Aer and Smoak of London Dissipated* (Lontoo, 1661), 5.
- 53 James Howellin kirje kapteeni Francis Baconille, 30.3.1630, lainattu teoksessa Parker, *Global Crisis*, 60.
- 54 N. Voigtländer ja H.-J. Voth, "The Three Horsemen of Riches: Plague, War, and Urbanization in Early Modern Europe", *Review of Economic Studies* 80 (2013), 774–811.
- 55 M. Waldinger, "The Economic Effects of Long-Term Climate Change: Evidence from the Little Ice Age", Centre for Climate Change Economics and Policy Working Paper No. 239 (2015), 1–46.
- 56 S. White, *The Climate of Rebellion in the Early Modern Ottoman Empire* (New York, 2011), 204–11; "Winter is Coming: The Long-Run Effects of Climate Change on Conflict, 1400–1900", NBER Working Paper 23033 (2017).
- 57 Waldinger, "Economic Effects of Long-Term Climate Change", 1–46.
- 58 O. Wetter et al., "The year-long unprecedented European heat and drought of 1540 – a worst case", *Climatic Change* 125 (2014), 349–63.
- 59 Abū al-Fazl, *Ain-i Akbari*, käant. H. Blochmann ja H. Jarrett, 3 vols (Calcutta, 1873–94), 2, 57.
- 60 Degroot, *Frigid Golden Age*, 33–4.
- 61 I. Pikirayi, "Environmental data and historical process: historical climatic reconstruction & the Mutapa state, 1450–1862", teoksessa W. Beinart ja J. McGregor (toim.), *Social History and African Environments* (Oxford, 2003), 60–71; M. Hannaford ja D. Nash, "Climate, history, society over the last millennium in southeast Africa", *WIREs Climate Change*, 7 (2016), 379.
- 62 Brook, "Nine Sloughs", 40.
- 63 Degroot, *Frigid Golden Age*, 34.
- 64 S. White, J. Brooke and C. Pfister, "Climate, Weather, Agriculture, and Food", teoksessa White, Pfister ja Mauelshagen (toim.), *Palgrave Handbook of Climate History*, 340; W. Behringer, "Die Krise von 1570. Ein Beitrag zur Krisengeschichte der Neuzeit", teoksessa M. Jakubowski ja H. Lehmann (toim.), *Um Himmels Willen: Religion in Krisenzeiten* (Göttingen, 2003), 58–136.
- 65 White, *Climate of Rebellion*, 80–1.
- 66 Camuffo ja Enzi, "Locust invasions and climatic factors", 63–4.
- 67 R. Endres, "Zur wirtschaftlichen und sozialen Lage Franken vor dem Dreissigjährigen Krieg", *Jahrbuch für fränkische Landesforschung* 28 (1968), 5–52.
- 68 Pfister, "Climatic Extremes, Recurrent Crises and Witch Hunts", 51–2.

- 69 Degroot, *Frigid Golden Age*, 161–73; R. Suykerbuyk, *The Matter of Piety: Zoutleeuw's Church of Saint Leonard and Religious Material Culture in the Low Countries (c. 1450–1620)* (Leiden, 2021), 240–55.
- 70 Pfister, "Climatic Extremes, Recurrent Crises and Witch Hunts", 33–73; A. Palmer et al., "Antarctic volcanic flux ratios from Law Dome ice cores", *Annals of Glaciology* 35 (2002), 329–32.
- 71 S. de Silva ja G. Zielinski, "Global influence of the AD 1600 eruption of Huaynaputina, Peru", *Nature* 393 (1998), 455–8.
- 72 K. Briffa et al., "Influence of volcanic eruptions on Northern Hemisphere summer temperature over the past 600 years", *Nature* 393 (1998), 450–5.
- 73 C. Pfister, "Weeping in the Snow: The Second Period of Little Ice Age-type Impacts, 1570–1630", teoksessa Behringer, Lehmann ja Pfister (toim.), *Kulturelle Konsequenzen der "Kleinen Eiszeit"*, 31–74.
- 74 G. Alfani, "The Famine of the 1590s in Northern Italy: An Analysis of the Greatest 'System Shock' of Sixteenth Century", *Histoire et Mesure* 26 (2011), 17–49.
- 75 Alfani, "Climate, Population and Famine in Northern Italy", 34–5.
- 76 Ibid., 36–40; G. Alfani, *Il Grand Tour dei Cavalieri dell'Apocalisse. L'Italia del "lungo Cinquecento" (1494–1629)* (Venice, 2010).
- 77 M.-C. Engels, *Merchants, Interlopers, Seamen and Corsairs: The 'Flemish' Community in Livorno and Genoa (1615–1635)* (Hilversum, 1997), 74–5.
- 78 G. Darby, *Spain in the Seventeenth Century* (Lontoo, 2013), 22; White, *Cold Welcome*, 81–2.
- 79 M. Clarke ja H. Rendell, "The impact of North Atlantic storminess on western European coasts: a review", *Quaternary International* 195 (2009), 31–41.
- 80 S. Chairi, "Climatic issues in early modern England: Shakespeare's views of the sky", *WIREs Climate Change* 10 (2019), 1–10; ks. myös P. Armstrong, "Preposterous nature in Shakespeare's tragedies", teoksessa M. Neill ja D. Schalkwyk (toim.), *The Oxford Handbook of Shakespearean Tragedy* (Oxford, 2016), 104–19; M. Hulme, "Climate", teoksessa B. Smith (toim.), *The Cambridge Guide to the Worlds of Shakespeare: Shakespeare's World, 1500–1660* (Cambridge, 2016), 1, 29–34.
- 81 Hannaford ja Nash, "Climate, history, society", 379–80; D. Beach, *The Shona and their Neighbours* (Oxford, 1994).
- 82 Ks. esim Degroot, *Frigid Golden Age*, 36; Brooke, *Climate Change*, 442–4.
- 83 J. Hunwick, *Timbuktu and the Songhay Empire: Al-Sa'idi's Ta'rīkh al-sūdān down to 1613 and Other Contemporary Documents* (Leiden,

- 1999); D. Yahya, *Morocco in the Sixteenth Century: Problems and Patterns in African Foreign Policy* (Atlantic Highlands, NJ, 1981).
- 84 J. Webb, *Desert Frontier: Ecological Change and Economic Change along the Western Sahel, 1600–1850* (Madison, WI, 1995), 47–8; E. Saad, *Social History of Timbuktu: The Role of Muslim Scholars and Notables, 1400–1900* (Cambridge, 1993).
- 85 H. Dunstan, "The Late Ming Epidemics: A Preliminary Survey", *Late Imperial China* 3 (1975), 1–59.
- 86 Brook, "Nine Sloughs", 40; T. Brook, "Comparative pandemics: The Tudor–Stuart and Wanli–Chongzhen years of pestilence, 1567–1666", *Journal of Global History* 15 (2020), 363–79.
- 87 A. Reid, "The Seventeenth Century Crisis in Southeast Asia", *Modern Asian Studies* 24 (1990), 649.
- 88 Grove ja Adamson, *El Niño in World History*, 61.
- 89 Nurul Haq, *Zubdat al-tawārīkh*, teoksessa H. Elliot (toim. ja käant.), *The History of India, as Told by its Own Historians: The Muhammadan Period*, 8 vols (Cambridge, 1873), 6, 193.
- 90 White, *Climate of Rebellion*, 78–226.
- 91 C. Bussov, *Moskovskaiia Kronika, 1584–1613* (Moskova, 1961), 222–4. Kuolleisuuslukemista ks. Parker, *Global Crisis*, 152.
- 92 White, *Cold Rebellion*, 146–7.
- 93 R. Smith ja D. Christian, *Bread and Salt: A Social and Economic History of Food and Drink in Russia* (Cambridge, 1984), 110.
- 94 "A rhyme set upon the wall of the Dutch churchyard in London, 5.5.1593", teoksessa J. Strype (toim.), *Annals of the Reformation*, 4 vols (Oxford, 1824), 4, 234–5.
- 95 C. Dunning, *Russia's First Civil War: The Time of Troubles and the Founding of the Romanov Dynasty* (University Park, PA, 2001), 13ff.; P. Bushkovitch, "Taxation, Tax Farming, and Merchants in Sixteenth-Century Russia", *Slavic Review* 37 (1978), 381–98.
- 96 G. Hamburg, *Russia's Path toward Enlightenment: Faith, Politics, and Reason, 1500–1801* (New Haven, 2016), 255.
- 97 Ks. esim. G. Agoston, "Habsburgs and Ottomans: Defense, Military Change, and Shifts in Power", *Turkish Studies Association Bulletin* 22 (1998), 126–41.
- 98 Lieberman, *Strange Parallels*, 1, 154–63.
- 99 Lainattu teoksessa Reid, "Seventeenth Century Crisis in Southeast Asia", 652.
- 100 J. Healey, *The First Century of Welfare: Poverty and Poor Relief in Lancashire, 1620–1730* (Cambridge, 2014), 4–26.

- 101 White, "Shewing the difference betweene their conjuration, and our invocation", 51–2.
- 102 K. Kupperman, "Environmental Stress and Rainmaking: Cosmic Struggles in Early Colonial Times", *ReVista. Harvard Review of Latin America* 6 (2007).
- 103 Grove ja Adamson, *El Niño in World History*, 63–4.
- 104 A. Reid, *A History of Southeast Asia: Critical Crossroads* (Chichester, 2015), 114–15.
- 105 M. Ricklefs, "Islamising Java: The Long Shadow of Sultan Agung", *Archipel* 56 (1998), 469–82.
- 106 Ks. N. van Doorn-Harder ja K. de Jong, "The Pilgrimage to Tembayat: Tradition and Revival in Indonesian Islam", *Muslim World* 91 (2001), 325–54; C. Guillot, "The Tembayat hill: clergy and royal power in Central Java from the 15th to the 17th century", teoksessa H. Chambert-Noir ja A. Reid (toim.), *The Potent Dead: Ancestors, Saints and Heroes in Contemporary Indonesia* (Honolulu, 2002), 141–59.
- 107 T. Wickman, "Narrating Indigenous Histories of Climate Change in the Americas and Pacific", teoksessa White, Pfister ja Maelshagen (toim.), *Palgrave Handbook of Climate History*, 397; B. Skopyk, "Rivers of God, Rivers of Empire: Climate Extremes, Environmental Transformation and Agroecology in Colonial Mexico", *Environment and History* 23 (2017), 497–500.
- 108 Pfister, "Climatic Extremes, Recurrent Crises and Witch Hunts", 46–63.
- 109 Parker, "Crisis and Catastrophe", 1062. Ks. ennen kaikkea Parker, *Global Crisis, passim*.
- 110 G. Alfani, "Plague in seventeenth century Europe and the decline of Italy: an epidemiological hypothesis", *European Review of Economic History* 17 (2013), 408–30.
- 111 de Vries, "Economic Crisis of the Seventeenth Century", 159–60.
- 112 G. Alfani, V. Gierok ja F. Schaff, "Economic Inequality in Preindustrial Germany, ca. 1300–1850", *Journal of Economic History* 82 (2022), 1–39. Ks. myös B. Milanovic, *Global Inequality: A New Approach for the Age of Globalization* (Cambridge, MA, 2016), 46–53.
- 113 G. Alfani ja M. Percoco, "Plague and long-term development: the lasting effects of the 1629–30 epidemic on the Italian cities", *Economic History Review* 72 (2019), 1175–1201.
- 114 P. Malanima, "When did England overtake Italy? Medieval and early modern divergence in prices and wages", *European Review of Economic History* 17 (2013), 45–70; M. Rota ja J. Weisdorf, "Italy and the little

- divergence in wages and prices: evidence from stable employment in rural areas”, *Economic History Review* 74 (2021), 449–70.
- 115 de Vries, “Economic Crisis of the Seventeenth Century”, 167–74.
- 116 Parker, *Global Crisis*, p. xxiii.
- 117 *Ibid.*, xxxv–xxxvi, 14.
- 118 K. Chen et al., “One Drought and One Volcanic Eruption Influenced the History of China: The Late Ming Dynasty Mega-drought”, *Geophysical Research Letters* 47 (2020), 1–9.
- 119 Ks. esim. J. Zheng et al., “How climate change impacted the collapse of the Ming dynasty”, *Climatic Change* 127 (2013), 169–82; Chen et al., “One Drought and One Volcanic Eruption”, 1–9; J. Zhao et al., “Role of the Summer Monsoon Variability in the Collapse of the Ming Dynasty: Evidences from Speleothem Records”, *Geophysical Research Letters* 48 (2021), 1–12.
- 120 M. Marmé, “Survival through transformation: how China’s Suzhou-centred world economy weathered the general crisis of the seventeenth century”, *Social History* 32 (2007), 144–65.
- 121 Brook, “Nine Sloughs”, 28–9.
- 122 A. Chan, *The Glory and Fall of the Ming Dynasty* (Norman, OK, 1982), 235–6. Ye Shaoyuanista ks. G. Fong, “Reclaiming Subjectivity in a Time of Loss: Ye Shaoyuan (1589–1648) and Autobiographical Writing in the Ming–Qing Transition”, *Ming Studies* 1 (2009), 21–41.
- 123 T. Brook, *The Troubled Empire: China in the Yuan and Ming Dynasties* (Cambridge, MA, 2010), 253–5; J. Parsons, *Peasant Rebellions of the Late Ming Dynasty* (Tucson, AZ, 1970), 17–21.
- 124 K. Swope, *The Military Collapse of China’s Ming Dynasty, 1618–44* (Abingdon, 2014), 190.
- 125 Swope, *Military Collapse*, 200–1.
- 126 T. Brook, *Confusions of Pleasure, Commerce and Culture in Ming China* (Berkeley, 1998), 153ff.; M. Marmé, “Locating Linkages or Painting Bull’s-Eyes around Bullet Holes? An East Asian Perspective on the Seventeenth-Century Crisis”, *American Historical Review* 113 (2008), 1062.
- 127 F. Wakeman, *The Great Enterprise: The Manchu Reconstruction of Imperial Order in Seventeenth Century China* (Berkeley, 1985), 16.
- 128 F. Wakeman, “China and the Seventeenth Century Crisis”, *Late Imperial China* 7 (1986), 10–14.
- 129 J. Warren, “Weather, History and Empire: The Typhoon Factor and the Manila Galleon Trade, 1565–1815”, teoksessa G. Wade ja L.

- Tana (toim.), *Anthony Reid and the Study of the Southeast Asian Past* (Singapore, 2012), 183–220.
- 130 Arteaga, Desierto ja Koyama, "Shipwrecked by Rents", CEPR Discussion Paper 15300 (2020), 1–50.
- 131 Parker, "Crisis and Catastrophe", 1059.
- 132 Marmé, "Survival through transformation", 1086; de Vries, "The Crisis of the Seventeenth Century: The Little Ice Age and the Mystery of the Great Divergence", *Journal of Interdisciplinary History* 44 (2014), 374–5.
- 133 J. Schlesinger, *A World Trimmed with Fur: Wild Things, Pristine Places and the Natural Fringes of Qing* (Stanford, 2017), 18ff.

SUURESTA JA PIENESTÄ DIVERGENSSISTÄ

- 1 Degroot, *Frigid Golden Age*, 82–91.
- 2 Jardine, *Worldly Goods*, 107.
- 3 M. Loderichs, *Rumphius' wonderwereld – Zeventiende-eeuwse natuurbeschrijvingen uit Amboon* (Zutphen, 2004).
- 4 J. Pimentel, "The Iberian Vision: Science and Empire in the Framework of a Universal Monarchy, 1500–1800", *Osiris* 15 (2000), 21.
- 5 Ibid., 26.
- 6 Ibid., 23.
- 7 Jardine, *Worldly Goods*, 172–3.
- 8 M. Pearson, "First Contacts between Indian and European Medical Systems: Goa in the Sixteenth Century", teoksessa D. Arnold (toim.), *Warm Climates and Western Medicine: The Emergence of Tropical Medicine, 1500–1900* (Leiden, 1996), 25–6.
- 9 J. Osterhammel, *Unfabling the East: The Enlightenment's Encounter with Asia* (Princeton, 2018), 58.
- 10 Ibid., 99, 147.
- 11 Ibid., 139, 311–13.
- 12 Varlık, "New Science and Old Sources", 205–6; H.-U. Lammel, "Western European Perception and Representation of Plagues in Eastern Europe, the Ottoman Empire and the Near East, 1650–1800", teoksessa S. Cavaciocchi (toim.), *Economic and Biological Interactions in Pre-Industrial Europe from the Thirteenth to Eighteenth Centuries* (Florence, 2010), 399–421.
- 13 P. Mansel, *Constantinople: City of the World's Desire, 1453–1924* (Lontoo, 1995), 382.
- 14 T. Babington Macaulay, "Minute on Education", teoksessa M. Young (toim.), *Prose and Poetry* (Cambridge, MA, 1967), 71–4.

- 15 S. Miller, *An Environmental History of Latin America* (Cambridge, 2015), 84–5.
- 16 Ibid., 95–7.
- 17 Ibid., 93–4.
- 18 Ibid., 57–8.
- 19 Zappia, *Traders and Raiders*, 1–20; N. Blackhawk, *Violence over the Land: Indians and Empires in the Early American West* (Cambridge, MA, 2006).
- 20 Abū al-Fazl, *Ain-I Akbari*, 3, 394–6.
- 21 Ks. esim. K. Morrison ja M. Lycett, "Forest products in a wider world: Early historic connections across southern India", teoksessa S. A. Abraham et al. (toim.), *Connections and Complexity: New Approaches to the Archaeology of South Asia* (Walnut Creek, CA, 2013), 127–42.
- 22 Richards, *Unending Frontier*, 17–38.
- 23 Y.-C. Wang, *Land Taxation in Imperial China, 1750–1911* (Cambridge, MA, 1973), 6–7; Schlesinger, *World Trimmed with Fur*, 51.
- 24 K. Pomeranz, "The Transformation of China's Environment, 1500–2000", teoksessa E. Burke ja K. Pomeranz (toim.), *The Environment and World History* (Berkeley, 2009), 118–64; R. Mostern, "Sediment and State in Imperial China: The Yellow River Watershed as an Earth System and a World System", *Nature and Culture* 11 (2016), 125.
- 25 P. Crossley, H. Siu ja D. Sutton, *Empire at the Margins: Culture, Ethnicity, and Frontier in Early Modern China* (Berkeley, 2006).
- 26 P. Perdue, *China Marches West: The Qing Conquest of Central Eurasia* (Cambridge, MA, 2005), 256–99.
- 27 Schlesinger, *World Trimmed with Fur*, 1–15.
- 28 Miller, *Environmental History of Latin America*, 87.
- 29 Warde, *Invention of Sustainability*, 102.
- 30 Ibid., 160.
- 31 D. Blackbourn, *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany* (Lontoo, 2006), 31–2.
- 32 Warde, *Invention of Sustainability*, 172.
- 33 A. Rahman, M.-A. Clarke ja S. Byrne, "The Art of Breaking People Down: The British Colonial Model in Ireland and Canada", *Peace Research* 49 (2017), 15–38.
- 34 Pomeranz, *The Great Divergence*; K. Pomeranz, "Re-Thinking the Late Imperial Chinese Economy: Development, Disaggregation and Decline, circa 1730–1930", *Itinerario* 22 (2000), 29–74.

- 35 J. Elliott, *The Old World and the New, 1492–1650* (Cambridge, 1970); K. Kupperman (toim.), *America in European Consciousness, 1493–1750* (Chapel Hill, NC, 1995).
- 36 Miller, *Environmental History of Latin America*, 61–3.
- 37 Ibid., 64.
- 38 Collingham, *Hungry Empire*, 67–71; J. Cock, "Cassava: A Basic Energy Source in the Tropics", *Science* 218 (1982), 755–62.
- 39 Collingham, *Hungry Empire*, 67.
- 40 N. Nunn ja N. Qian, "The Potato's Contribution to Population and Urbanization: Evidence from a Historical Experiment", *Quarterly Journal of Economics* 126 (2011), 599–600.
- 41 Ibid., 601–2.
- 42 Ibid., 602–4.
- 43 Smith ja Christian, *Bread and Salt*, 199–200.
- 44 Smith, *Wealth of Nations*, 67–8.
- 45 Nunn ja Qian, "Potato's Contribution to Population and Urbanization", 640–3.
- 46 M. Iyigun, N. Nunn ja N. Qian, "The Long-Run Effects of Agricultural Productivity on Conflict", NBER Working Paper 24066 (2017), 1–50; D. Acemoglu et al., "A Dynamic Theory of Resource Wars", *Quarterly Journal of Economics* 127 (2012), 283–331.
- 47 R. Jia, "Weather Shocks, Sweet Potatoes and Peasant Revolts in Historical China", *Economic Journal* 124 (2013), 92–118.
- 48 Nunn ja Qian, "Potato's Contribution to Population and Urbanization", 593–650.
- 49 E. Jones, *The European Miracle: Environments, Economies and Geopolitics in the History of Europe and Asia* (Cambridge, 2003).
- 50 S. Becker ja L. Woessman, "Was Weber Wrong? A Human Capital Theory of Protestant Economic History", *Quarterly Journal of Economics* 124 (2009), 531–96.
- 51 P. Lindert, "Voice and Growth: Was Churchill Right?", *Journal of Economic History* 63 (2003), 315–50. Reformaation vaikutuksista Euroopan ulkopuolella yleisemmin ks. tärkeä uusi tutkimus: U. Rublack (toim.), *Protestant Empires: Globalizing the Reformation* (Cambridge, 2020).
- 52 D. Cantoni ja N. Yuchtman, "Medieval Universities, Legal Institutions and the Commercial Revolution", NBER Working Paper 17977 (2012), 1–59.
- 53 Smith, *Wealth of Nations*, 198.

- 54 J. Shih, *Chinese Rural Society in Transition: A Case Study of the Lake Tai Area, 1368–1800* (Berkeley, 1992), 29–30.
- 55 J. van Zanden, "The road to the Industrial Revolution: hypotheses and conjectures about the medieval origins of the 'European Miracle'", *Journal of Global History* 3 (2008), 342–3.
- 56 J. Mokyr, *The Enlightened Economy: Britain and the Industrial Revolution, 1700–1850* (Lontoo, 2011).
- 57 M. Wiesner-Hanks, *Women and Gender in Early Modern Europe* (Cambridge, 2019), 159–228.
- 58 M. Kelly, J. Mokyr ja C. Ó Grada, "The Mechanics of the Industrial Revolution", *Journal of Political Economy* 131 (2023).
- 59 J. Mokyr, A. Sarid, and K. van der Beek, "The Wheels of Change: Technology Adoption, Millwrights and the Persistence in Britain's Industrialisation", *The Economic Journal* 132 (2022), 1894–1926.
- 60 M. Kelly, K. Mokyr ja C. Ó Gráda, "Precocious Albion: A New Interpretation of the British Industrial Revolution", *Annual Review of Economics* 6 (2014), 363–89.
- 61 Allen, *British Industrial Revolution in Global Perspective*, 25–56.
- 62 van Zanden, "Road to the Industrial Revolution", 348.
- 63 Wakeman, "China and the Seventeenth Century Crisis", 1–26, 237ff.
- 64 Pfister et al., "The meteorological framework and the cultural memory of three severe winter-storms in early eighteenth-century Europe", 281–310.
- 65 S. Johnson, "El Niño, Environmental Crisis, and the Emergence of Alternative Markets in the Hispanic Caribbean, 1760s–70s", *William and Mary Quarterly* 62 (2005), 365–410.
- 66 Ibid., 398–400.
- 67 "Declaration and Resolves of the First Continental Congress", teoksessa J. Vile (toim.), *The Declaration of Independence: America's First Founding Document in US History and Culture* (Santa Barbara, CA, 2019), 14.
- 68 "John Adams to Isaac Smith Sr, 1.6.1776", teoksessa W. Morgan (toim.), *Naval Documents of the American Revolution*, 12 vols (Washington, DC, 1964–2013), 5, 338.
- 69 S. Johnson, *Climate and Catastrophe in Cuba and the Atlantic World in the Age of Revolution* (Chapel Hill, NC, 2011), 132–6.
- 70 D. Clingingsmith ja J. Williamson, "Mughal Decline, Climate Change and Britain's Industrial Ascent: An Integrated Perspective on India's 18th and 19th Century Deindustrialization", NBER Working Paper 11730 (2005), 1–38.

- 71 J. Nehru, *The Discovery of India* (Lontoo, 1947); T. Roy, "Economic History and Modern India: Redefining the Link", *Journal of Economic Perspectives* 16 (2002), 109–30.
- 72 W. Hunter, *The Annals of Rural Bengal* (Lontoo, 1868), 21.
- 73 Ibid., 22.
- 74 W. Dalrymple, *The Anarchy* (Lontoo, 2019), 215–17.
- 75 Ibid., 220–3.
- 76 Ibid., 229–32; Frankopan, *Silk Roads*, 275–9.
- 77 T. Thordarson ja S. Self, "Atmospheric and environmental effects of the 1783–1784 Laki eruption: A review and reassessment", *Journal of Geophysical Research* 108 (2003), 1–29.
- 78 L. Oman et al., "Modeling the distribution of the volcanic aerosol cloud from the 1783–1784 Laki eruption", *Journal of Geophysical Research* 111 (2006), 1–15.
- 79 B. Franklin, "Meteorological imaginations and conjectures", *Memoirs and Proceedings of the Manchester Literary and Philosophical Society* 122 (1784), 237–40.
- 80 Thordarson ja Self, "Atmospheric and environmental effects of the 1783–1784 Laki eruption", 21–2.
- 81 B. Zambri et al., "Modeling the 1783–4 Laki Eruption in Iceland: 2. Climate Impacts", *JGR Atmospheres* 124 (2019), 6770–90.
- 82 Thordarson ja Self, "Atmospheric and environmental effects of the 1783–1784 Laki eruption", 15–16. Meksikosta ks. G. Endfield, *Climate and Society in Colonial Mexico: A Study in Vulnerability* (Malden, MA, 2008), 177–81.
- 83 R. D'Arrigo et al., "The anomalous winter of 1783–1784: Was the Laki eruption or an analog of the 2009–2010 winter to blame?", *Geophysical Research Letters* 38 (2011).
- 84 F. Pausata et al., "Impacts of a high-latitude volcanic eruption on ENSO and AMOC", *PNAS* 112 (2015), 13,784–8; F. Pausata et al., "ENSO response to high-latitude volcanic eruptions in the Northern Hemisphere: the role of the initial conditions", *Geophysical Research Letters* 43 (2016) 8694–702.
- 85 Grove ja Adamson, *El Niño in World History*, 82–3; myös E. Cook et al., "Asian Monsoon Failure and Megadrought during the Last Millennium", *Science* 328 (2010), 486–9.
- 86 V. Damodaran, "The East India Company, Famines and Ecological Conditions in Eighteenth Century Bengal", teoksessa A. Winterbottom, A. Lester ja V. Damodaran (toim.), *The East India Company and the Natural World* (Lontoo, 2015), 80–101.

- 87 A. Janetta, "Famine Mortality in Nineteenth-Century Japan: The Evidence from a Temple Death Register", *Population Studies* 46 (1992), 428–9.
- 88 C. Totman, *Early Modern Japan* (Berkeley, 1993), 239.
- 89 M. Ravina, *Land and Lordship in Early Modern Japan* (Stanford, 1999), 128–41.
- 90 D. Crecelius, *The Roots of Modern Egypt: A Study of the Regimes of 'Ali Bey al-Kabir and Muhammad Bey Abu al-Dhahab, 1760–1775* (Minneapolis, MN, 1981), 79–91, 159–68.
- 91 A. Mikhail, "Ottoman Iceland: A Climate History", *Environmental History* 20 (2015), 262–84; Endfield, *Climate and Society in Colonial Mexico*.
- 92 Mikhail, "Ottoman Iceland", 275–6.
- 93 V. Damodaran et al., "The 1780s: Global Climate Anomalies, Floods, Droughts and Famines", teoksessa White, Pfister ja Mauelshagen (toim.), *Palgrave Handbook of Climate History*, 539–40.
- 94 R. Grove, "The Great El Niño of 1789–93 and its Global Consequences: Reconstructing an Extreme Climate Event in World Environmental History", *Medieval History Journal* 10 (2007), 75–98; mega-Niño-ilmiöstä ks. B. Meggers, "Archaeological Evidence for the Impact of Mega-Niño Events in Amazonia during the Past Two Millennia", *Climatic Change* 28 (1994), 321–38.
- 95 J. Gergis ja A. Fowler, "A History of El Niño–Southern Oscillation (ENSO) Events since A.D. 1525: Implications for Future Climate Change", *Climatic Change* 92 (2009), 343–87.
- 96 Damadoran et al., "The 1780s", 531–2.
- 97 Ibid., 532–4.
- 98 Grove, "The Great El Niño of 1789–93", 84–5.
- 99 Ibid., 80–3.
- 100 Ibid., 86–7; J. Guy, "Ecological factors in the rise of Shaka and the Zulu kingdom", teoksessa S. Marks ja A. Atmore (toim.), *Economy and Society in Pre-Industrial South Africa* (Lontoo, 1980), 102–19.
- 101 Wickman, "Narrating Indigenous Histories", 393–4.
- 102 L. Abad ja N. Maurer, "Do Pandemics Shape Elections? Retrospective Voting in the 1918 Spanish Flu Pandemic in the United States", CEPR Discussion Paper 15678 (2021), 13–14.
- 103 Grove, "The Great El Niño of 1789–93", 91–3.
- 104 A. Taylor, "The Hungry Year: 1789 on the Northern Border of Revolutionary America", teoksessa A. Johns, *Dreadful*

- Visitations: Confronting Natural Catastrophe in the Age of Enlightenment* (Lontoo, 2013), 156–7.
- 105 Ibid., 158.
- 106 S. Schama, *Citizens: A Chronicle of the French Revolution* (Lontoo, 1989), 330–2.
- 107 S. Hazareesingh, *Black Spartacus: The Epic Life of Toussaint Louverture* (New York, 2020); J. Marr ja J. Cathey, "The 1802 Saint-Domingue Yellow Fever Epidemic and the Louisiana Purchase", *Journal of Public Health Management and Practice* 19 (2013), 77–82; Miller, *Environmental History of Latin America*, 112–13.
- 108 J. Belich, *Replenishing the Earth: The Settler Revolution and the Rise of the Angloworld* (Oxford, 2001), 55.

TEOLLISUUS, LUONTO JA LUONNONVARAT

- 1 D. Hume, "On the Populousness of Ancient Nations", teoksessa *Essays: Moral; Political; and Literary*, toim. E. Miller (Indianapolis, 1987), 448–9.
- 2 Ibid., 450–1.
- 3 B. Franklin, "From Benjamin Franklin to Ezra Stiles, 29.5.1763", teoksessa L. Labaree (toim.), *The Papers of Benjamin Franklin*, 43 vols (New Haven, 1959), 10, 264–7.
- 4 S. Johnson, "Review of Du Halde's *Description of China*", *Gentleman's Magazine* 12 (1742), 320.
- 5 Ks. P. Moore, *Endeavour: The Ship and the Attitude that Changed the World* (Lontoo, 2018).
- 6 S. Bedini, *Jefferson: Statesman of Science* (New York, 1990), 73–5.
- 7 J. Boyd (toim.), *The Papers of Thomas Jefferson*, 27 vols (Princeton, 1955–97), 7, 31.
- 8 Bedini, *Jefferson*, 75.
- 9 T. Jefferson, *Notes on the State of Virginia* (Richmond, VA, 1853), 80–90.
- 10 H. Williamson, "An Attempt to Account for the Change of Climate Which Has Been Observed in the Middle Colonies in North America", *Transactions of the American Philosophical Society* 1 (1769–71), 272–80.
- 11 S. Williams, *The Natural and Civil History of Vermont* (Walpole, NH, 1794), 57.
- 12 N. Webster, "On the Supposed Change in the Temperature of Winter", teoksessa N. Webster, *A Collection of Papers on Political, Literary and Moral Subjects* (New York, 1843), 144–8.
- 13 G.-L. de Buffon, "Époques de la nature", teoksessa G.-L. de Buffon, *Histoire Naturelle*, 5 vols (Pariisi, 1778), 1, 240–1.

- 14 T. Malthus, *An Essay on the Principle of Population, as it Affects the Future Improvement of Society. With Remarks on the Speculations of Mr Godwin, M. Condorcet and Other Writers* (Lontoo, 1798), 44.
- 15 J. Leslie, *An Experimental Inquiry into the Nature and Propagation of Heat* (Lontoo, 1804), 180–2. Ks. myös A. Zilberstein, "Inured to Empire: Wild Rice and Climate Change", *William and Mary Quarterly* 72.1 (2015), 149–50.
- 16 Zilberstein, "Inured to Empire: Wild Rice and Climate Change", 127–58.
- 17 D. Blackbourn, *The Conquest of Nature: Water, Landscape and the Making of Modern Germany* (Lontoo, 2006), 21.
- 18 J. Frey, "The Indian Saltpeter Trade, the Military Revolution, and the Rise of Britain as a Global Superpower", *The Historian* 71 (2009), 507–54.
- 19 J. Houdaille, "Pertes de l'armée de terre sous l'empire", *Population* 27 (1972), 27–50; myös J. Houdaille, "Le problème des pertes de la guerre", *Revue d'Histoire Moderne et Contemporaine* 17 (1970), 411–23.
- 20 C. Hall, "The Royal Navy and the Peninsular War", *Mariner's Mirror* 4 (1993), 413–18.
- 21 J.-J. Voth, B. Caprettini ja A. Trew, "Fighting for Growth: Labor Scarcity and Technological Progress During the British Industrial Revolution", University of Glasgow, Adam Smith Business School, Working Paper Series 2022–15 (2022), 1–62.
- 22 R. Poole, *Peterloo: The English Uprising* (Oxford, 2019).
- 23 Ibid., 18.
- 24 P. Pickering ja A. Tyrrell, *The People's Bread: A History of the Anti–Corn Law League* (Lontoo, 2000).
- 25 C. Oppenheimer, *Eruptions that Shook the World* (Cambridge, 2011), 299–311.
- 26 S. Cao, Y. Li ja B. Yang, "Mt. Tambora, Climatic Changes, and China's Decline in the Nineteenth Century", *Journal of World History* 23 (2012), 587–607; E. Skeen, "'The Year without a Summer': A Historical View", *Journal of the Early Republic* 1 (1981), 51–67; W. Soon ja S. Yaskell, "Year without a Summer", *Mercury* 32 (2003), 13–22.
- 27 Oppenheimer, *Eruptions*, 313–17.
- 28 G. D'Arcy Wood, *Tambora: The Eruption that Changed the World* (Princeton, 2014), 45–71.
- 29 Ibid., 220–4.
- 30 Ibid., 78–84.
- 31 Ibid., 72–96.

- 32 M. Harrison, "A Dreadful Scourge: Cholera in early nineteenth-century India", *Modern Asian Studies* 54 (2020), 502–53.
- 33 R. Peckham, *Epidemics in Modern Asia* (Cambridge, 2016), 53–63.
- 34 C. Emsley, *British Society and the French Wars, 1793–1815* (Basingstoke, 1979), 173.
- 35 J. Tosh, "Jeremiah Goldswain's Farewell: Family and Fortune in Early Nineteenth-Century English Emigration", *History Workshop Journal* 77 (2014), 26–44; Belich, *Replenishing the Earth*, 147.
- 36 Belich, *Replenishing the Earth*, 146.
- 37 E. Richards, *Britannia's Children: Emigration from England, Scotland, Wales and Ireland since 1600* (Lontoo, 2004), 110–11.
- 38 Ibid., 118.
- 39 A. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, CT, 2003), 214–15.
- 40 L. Puttermans ja D. Weil, "Post-1500 Population Flows and the Long-Run Determinants of Economic Growth and Inequality", *Quarterly Journal of Economics* 125 (2010), 1627–82.
- 41 T. Hatton ja J. Williamson, "Migrations from Europe in the Late Nineteenth Century?", *Population and Development Review* 20 (1994), 533–59; tapauutukimukseksa R. Abramitzky, L. Platt Boustan ja K. Eriksson, "Europe's Tired, Poor, Huddled Masses: Self-Selection and Economic Outcomes in the Age of Mass Migration", NBER Working Paper 15684 (2010), 1–50.
- 42 T. Dublin (toim.), *Immigrant Voices: New Lives in America, 1773–1986* (Urbana, IL, 1993), 78–80.
- 43 C. Saunt, *Unworthy Republic: The Dispossession of Native Americans and the Road to Indian Territory* (New York, 2020), xii, 5.
- 44 D. Martinez, *Documents of American Indian Removal* (Santa Barbara, CA, 2019), 41–4.
- 45 Saunt, *Unworthy Republic*, 14, 17.
- 46 Collingham, *Hungry Empire*, 190–2.
- 47 Belich, *Replenishing the Earth*, 82–3.
- 48 Ibid., 1.
- 49 D. Moon, *The Plough that Broke the Steppes: Agriculture and Environment on Russia's Grasslands, 1700–1914* (Oxford, 2013), 16–17.
- 50 D. Moon, "Peasant Migration, the Abolition of Serfdom and the Internal Passport System in the Russian Empire, c.1800–1914", teoksessa D. Eltis (toim.), *Free and Coerced Migration: Global Perspectives* (Stanford, 2002), 324–57.

- 51 J. Reardon-Anderson, *Reluctant Pioneers: China's Expansion Northward, 1644–1937* (Stanford, 2005), 18–84.
- 52 J. Goldstone, "Efflorescences and Economic Growth in World History: Rethinking the 'Rise of the West' and the Industrial Revolution", *Journal of World History* 13 (2002), 364.
- 53 G. Clark ja D. Jacks, "Coal and the Industrial Revolution", *European Review of Economic History* 11 (2007), 39–72; ks. myös P. Vries, "Are Coal and Colonies Really Crucial? Kenneth Pomeranz and the Great Divergence", *Journal of World History* 12 (2001), 407–46.
- 54 D. Theodoridis, P. Warde ja A. Kander, "Trade and overcoming land constraints in British industrialization: an empirical assessment", *Journal of Global History* 13 (2018), 328–51.
- 55 Pomeranz, *Great Divergence*, 60–4; Goldstone, "Efflorescences and Economic Growth", 348–53; Belich, *Replenishing the Earth*, 11–13; P. Malanima, "Energy crisis and growth, 1650–1850: the European deviation in a comparative perspective", *Journal of Global History* 1 (2006), 101–21; P. O'Brien, "Colonies in a Globalizing Economy, 1815–1948", teoksessa B. Gillis ja W. Thompson (toim.), *Globalization and Global History* (Lontoo, 2006), 248–91; P. O'Brien, "European Economic Development: The Contribution of the Periphery", *Economic History Review* 35 (1982), 1–18.
- 56 Belich, *The World the Plague Made*, 420, 428.
- 57 R. Allen, *The British Industrial Revolution in Global Perspective* (Cambridge, 2014), 80–4; Belich, *The World the Plague Made*, 421.
- 58 O'Brien, "Colonies in a Globalizing Economy", 248–91; O'Brien, "European Economic Development", 1–18.
- 59 S. Heblitch, S. Redding ja H.-J. Voth, "Slavery and the British Industrial Revolution", NBER Working Paper 30451 (2022), 1–45.
- 60 O'Brien, "Colonies in a Globalizing Economy", 90–8.
- 61 Pomeranz, "Re-Thinking the Late Imperial Chinese Economy", 29–74.
- 62 Belich, *The World the Plague Made*, 289–300.
- 63 J. Brolin ja A. Kander, "Environmental factors in trade during the great transformation: advancing the geographical coverage before 1950", *Journal of Global History* 15 (2020), 250–1.
- 64 A. Stone, *Petrified Intelligence: Nature in Hegel's Philosophy* (Albany, NY, 2005).
- 65 H. Spalding, "The Black Sea and the Caspian", *Van Nostrand's Eclectic Engineering Magazine* 15 (1876), 122–7; Moon, *Plough that Broke the Steppes*, 212.
- 66 "The Black Sea and the Caspian", *The Age*, 7.8.1876.

- 67 D. Davis, *The Arid Lands: History, Power, Knowledge* (Cambridge, MA, 2015), 83.
- 68 M. Williams, *Deforesting the Earth: From Prehistory to Global Crisis* (Chicago, 2003), 430.
- 69 H. Haygarth, *Recollections of Bush Life in Australia during a Residence of Eight Years in the Interior* (Lontoo, 1864), 121.
- 70 Moon, *Plough that Broke the Steppes*, 173–4.
- 71 Ibid., 120.
- 72 D. Moon, "Agriculture and the Environment on the Steppes in the Nineteenth Century", teoksessa N. Bregfoyle, A. Schrader ja W. Sunderland (toim.), *Peopling the Russian Periphery: Borderland Colonisation in Eurasian History* (Abingdon, 2007), 88–90.
- 73 Moon, *Plough that Broke the Steppes*, 118–38.
- 74 M. Drolet, "Nature, Science and the Environment in Nineteenth-Century French Political Economy: The Case of Michel Chevalier (1805–79)", *Modern Intellectual History* 15 (2018), 711–45.
- 75 M. Gadgil ja R. Guha, *This Fissured Land: An Ecological History of India* (New Delhi, 1992), 116ff.
- 76 Williams, *Deforesting the Earth*, 335.
- 77 Ibid., 354ff.; Gadgil ja Guha, *This Fissured Land*, *passim*.
- 78 J. Weaver, *The Great Land Rush and the Making of the Modern World* (Montreal, 2003), 88–90.
- 79 K. Sivaramakrishnan, "Colonialism and Forestry in India: Imagining the Past in Present Politics", *Comparative Studies in Society and History* 37 (1995), 16–17.
- 80 C. Ross, *Ecology and Power in the Age of Empire: Europe and the Transformation of the Tropical World* (Oxford, 2017), 246.
- 81 Ibid., 297.
- 82 P. Hirst ja G. Thompson, *Globalization in Question: The International Economy and the Possibilities of Governance* (Cambridge, MA, 1996), 31.
- 83 Survival International, "How will we survive? The destruction of the Congo Basin tribes in the name of conservation" (Lontoo, 2017); Middle East Monitor, "Tanzania: Maasai people face violence, eviction amid protests over UAE-owned game reserve", 22.6.2022.
- 84 H. Wauchope et al., "Protected areas have a mixed impact on waterbirds, but management helps", *Nature* 605 (2022), 1–19.
- 85 Beinart ja Hughes, *Environment and Empire*, 66–7.
- 86 P. Lane, "Material Desires, Ecological Anxieties and East African Elephant Ivory from a Long-Term Perspective", *Environmental History* 24 (2019), 688–94.

- 87 Beinart ja Hughes, *Environment and Empire*, 67–8.
- 88 Ibid., 64–9.
- 89 Belich, *Replenishing the Earth*, 3–4.
- 90 Ibid., 49.
- 91 Ibid., 79.
- 92 P. Sharp ja J. Weisdorf, "Globalization revisited: Market integration and the wheat trade between North America and Britain from the eighteenth century", *Explorations in Economic History* 50 (2013), 90.
- 93 O. Barak, *Powering Empire: How Coal Made the Middle East and Sparked Global Carbonization* (Oakland, CA, 2020).
- 94 O. Figes, *The Europeans: Three Lives and the Making of a Cosmopolitan Culture* (Lontoo, 2019), 43–52, 220–6.
- 95 H.-J. Teuteberg, *Die Rolle des Fleischextrakts für die Ernährungswissenschaften und den Aufstieg der Suppenindustrie* (Stuttgart, 1990); R. Woods, *The Herds Shot around the World: Native Breeds and the British Empire, 1800–1900* (Chapel Hill, NC, 2017).
- 96 I. Gazeley ja A. Newell, "The First World War and working-class food consumption in Britain", *European Review of Economic History* 17 (2013), 71–94.
- 97 T. Dubois, "Many roads from pasture to plate: a commodity chain approach to China's beef trade, 1732–1931", *Journal of Global History* 14 (2019), 22–43.
- 98 Collingham, *Hungry Empire*, 232, 223.
- 99 Ibid., 223.
- 100 Ibid., 218.
- 101 Belich, *Replenishing the Earth*, 3, 113.
- 102 Clingingsmith ja Williamson, "Mughal Decline, Climate Change and Britain's Industrial Ascent", 1–38.
- 103 S. Ambirajan, "Malthusian population theory and Indian famine policy in the nineteenth century", *Population Studies* 30 (1976), 8.
- 104 Collingham, *Hungry Empire*, 221; S. Sweeney, "Indian Railways and Famine, 1875–1914: Magic Wheels and Empty Stomachs", *Essays in Economic and Business History* 26 (2008), 146; W. Cosgrove et al., "Colonialism international trade and the nation state", teoksessa L. Newman (toim.), *Hunger in History* (Oxford, 1990), 234; D. Hall-Matthews, *Peasants, Famine and the State in Colonial Western India* (Lontoo, 2005), 8.
- 105 S. Beckert, "Emancipation and Empire: Reconstructing the worldwide web of cotton production in the age of the American Civil War", *American Historical Review* 109 (2004), 1409–10.

- 106 Ibid., 1410; Ross, *Ecology and Power*, 29.
- 107 H. Berger ja M. Spoerer, "Economic Crises and the European Revolutions of 1848", *Journal of Economic History* 61 (2001), 293–326; P. Wilson (toim.), *1848: The Age of Revolutions* (Burlington, VT, 2006).
- 108 E. Baptist, *The Half Has Never Been Told: Slavery and the Making of American Capitalism* (New York, 2016), 126; French, *Born in Blackness*, 366.
- 109 Beckert, "Emancipation and Empire", 1424–5.
- 110 Ibid., 1430.
- 111 Ibid., 1414.
- 112 K. Cuno, "African Slaves in 19th-Century Rural Egypt", *International Journal of Middle East Studies* 41 (2009), 186–8.
- 113 L. Satya, *Cotton and Famine in Berar, 1850–1900* (New Delhi, 1997), 273–300.
- 114 Ross, *Ecology and Power*, 37–9; R. Owen, *Cotton and the Egyptian Economy, 1820–1914: A Study in Trade and Development* (Oxford, 1969), 98–102.

KUOHUNNAN AIKAKAUSI

- 1 Ross, *Ecology and Power*, 35–6.
- 2 Ibid., 99.
- 3 Ibid.; myös H. Hobhouse, *Seeds of Wealth: Four Plants that Made Men Rich* (Oxford, 2003), 125–37.
- 4 Ross, *Ecology and Power*, 106–7, 100–1, 111–12; J. Drabble, *Rubber in Malaya, 1876–1922: The Genesis of the Industry* (Oxford, 1973), s. 216–19.
- 5 L. Córdoba, "White Blood, Black Gold: The Commodification of Wild Rubber in the Bolivian Amazon, 1870–1920", *Environmental History* 24 (2019), 695–702.
- 6 C. Elkins, *Legacy of Violence: A History of the British Empire* (Lontoo, 2022), 73.
- 7 J. Mackenzie, "The Popular Culture of Empire in Britain", teoksessa J. Brown ja W. Louis (toim.) *The Twentieth Century* (Oxford, 1999), 212–31.
- 8 P. Curtin, *Disease and Empire: The Health of European Troops in the Conquest of Africa* (Cambridge, 1998), 23–8; R. Deb Roy, *Malaria! Subjects: Empire, Medicine and Nonhumans in British India, 1820–1909* (Cambridge, 2017); S. Gänger, "Cinchona Harvest, Deforestation, and 'Extinction' in the Viceroyalty of New Granada, 1752–1811", *Environmental History* 24 (2019), 673–9.
- 9 Ross, *Ecology and Power*, 138–9.

- 10 Ibid., 139–55; S. Naylor, "Spacing the Can: Empire, Modernity, and the Globalisation of Food", *Environment and Planning A* 32 (2000), 1625–39.
- 11 Richards, *Unending Frontier*, 576–622.
- 12 E. Dolin, *Leviathan: The History of Whaling in America* (New York, 2007).
- 13 G. Cushman, *Guano and the Opening of the Pacific World: A Global Ecological History* (Cambridge, 2013), 41–3.
- 14 Ibid., 8.
- 15 Ibid., 23–7.
- 16 Ibid., 45–8.
- 17 J. Conrad, *Lord Jim* (Lontoo, 1993), ch. 14, 102–8. Suomentanut O. Kostiainen: *Lord Jim*, WSOY 1930.; Cushman, *Guano*, 98.
- 18 R. Dillon, "A Tall Tale about the Guano Trade", *Western Folklore* 11 (1952), 125.
- 19 Cushman, *Guano*, 60–74.
- 20 P. Guardino, The Dead March. A History of the Mexican American War (Cambridge, MA: 2017).
- 21 Ibid., 54–6, 81–2; C. Duffy Barnett, "The Edges of Empire and the Limits of Sovereignty: American Guano Islands", *American Quarterly* 57 (2005).
- 22 C. Simmonds, *The Battle of Midway* (Oxford, 2011).
- 23 Cushman, *Guano*, 73. Perun valtionvelasta ks. C. Vizcarra, "Guano, Credible Commitments, and Sovereign Debt Repayment in Nineteenth-Century Peru", *Journal of Economic History* 69 (2009), 358–87.
- 24 J. Baron, "Sailors' scurvy before and after James Lind – a reassessment", *Nutrition Reviews* 67 (2009), 315–32.
- 25 A. Dimico, A. Isopi ja O. Olsson, "Origins of the Sicilian Mafia: The Market for Lemons", *Journal of Economic History* 77 (2017), 1083–1115.
- 26 C. Ó Gráda, "The Next World and the New World: Relief, Migration, and the Great Irish Famine", *Journal of Economic History* 79 (2019), 319–55.
- 27 L. Gómez-Alpizar, I. Carbone ja J. Ristaino, "An Andean origin for *Phytophthora infestans* inferred from nuclear and mitochondrial DNA sequences", *PNAS* 104 (2007), 3306–11; M. Martin et al., "Genomic characterization of a South American *Phytophthora* hybrid mandates reassessment of the geographic origins of *Phytophthora infestans*", *Molecular Biology and Evolution* 33 (2016), 478–91; P. Bourke, "Emergence of potato blight, 1843–46", *Nature* 203 (1964), 805–8.
- 28 C. Ó Gráda, *Black '47 and Beyond: The Great Irish Famine in History, Economy, and Memory* (Princeton, 1999).

- 29 C. Kinealy, *The Great Irish Famine: Impact, Ideology and Rebellion* (Basingstoke, 2001).
- 30 H. Hirota, *Expelling the Poor: Atlantic Seaboard States and the Nineteenth-Century Origins of American Immigration Policy* (New York, 2017).
- 31 W. Collins ja A. Zimran, "The Economic Assimilation of Famine Irish Migrants to the United States", NBER Working Paper 25287 (2017), 1–48.
- 32 Ks. esim. <https://www.irishcentral.com/news/census-shows-almost-seven-times-more-irish-americans-than-population-of-ireland-218344001-237779801>.
- 33 A. McKeown, "Global migration, 1846–1940", *Journal of World History* 15 (2004), 157–8.
- 34 Ibid., 159.
- 35 J. Osterhammel, *Die Verwandlung der Welt: Eine Geschichte des 19. Jahrhunderts* (München, 2009), 159.
- 36 H. Maude, *Slavers in Paradise: The Peruvian Slave Trade in Polynesia, 1862–1864* (Stanford, 1981).
- 37 D. Northrop, *Indentured Labor in the Age of Imperialism, 1834–1922* (Cambridge, 1995); E. Collingham, *Imperial Bodies: The Physical Experience of the Raj, c.1800–1947* (Cambridge, 2001), 140–1.
- 38 Driscoll, *The Whites Are the Enemies of Heaven*, 35.
- 39 Collingham, *Imperial Bodies*, 140–1.
- 40 J. Loadman, *Tears of the Tree* (Oxford, 2005), 140–1.
- 41 K. Marx, *Capital*, kään. B. Fowkes, 3 vols (Lontoo, 1976–81), 1, 895. suomentaneet O. V. Louhivuori, Mauri Ryömä, Tuure Lehén ja Antero Tiusanen: *Pääoma*, Editys 1974, 1976.
- 42 Ross, *Ecology and Power*, 112.
- 43 Belich, *Replenishing the Earth*, 507–8.
- 44 A. Knighton, "River adjustment to changes in sediment load: The effects of tin mining on the Ringarooma River, Tasmania, 1875–1984", *Earth Surface Processes and Landforms* 14 (1989), 333–59; Ross, *Ecology and Power*, 149–50.
- 45 U. Förstner ja G. Wittman, *Metal Pollution in the Aquatic Environment* (Berliini, 1979).
- 46 R. Eisler ja S. Wiemeyer, "Cyanide Hazards to Plants and Animals from Gold Mining and Related Water Issues", *Reviews of Environmental Contamination and Toxicology* 183 (2004), 21–54.
- 47 Ibid., 22; S. Fields, "Tarnishing the Earth: Gold Mining's Dirty Secret", *Environmental Health Perspectives* 109 (2001), 474–81.
- 48 Beinart ja Hughes, *Environment and Empire*, 133–6.

- 49 *Report of the Indian Famine Commission* (Lontoo, 1880), 9.
- 50 S. Amrith, *Unruly Waters: How Mountain Rivers and Monsoons Have Shaped South Asia's History* (Lontoo, 2018), 40–1.
- 51 Ibid., 18.
- 52 Ibid., 45; R. Guha (toim.), *Subaltern Studies III: Writings on South Asian History and Society* (Delhi, 1984), 69.
- 53 Beinart ja Hughes, *Environment and Empire*, 134–5.
- 54 Amrith, *Unruly Waters*, 52–5.
- 55 Ross, *Ecology and Power*, 312–14; Hollannin Itä-Intiasta ks. W. Ravesteijn, *De zegenrijke heeren der wateren: irrigatie en staat op Java, 1832–1942* (Delft, 1997), 111–206.
- 56 Guha (toim.), *Subaltern Studies III*, 69; Beinart ja Hughes, *Environment and Empire*, 137.
- 57 Dalhousie to the Court of Directors, 20.4.1853, teoksessa S. Settar (toim.), *Railway Construction in India: Select Documents*, 2 vols (Delhi, 1999), 2, 23–57.
- 58 Ks. esim. R. White, *Railroaded: The Transcontinentals and the Making of Modern America* (New York, 2011); C. Leonard et al., "Land prices and railroad building in European Russia, 1860s to the early 1900s", *Russian Journal of Economics* 7 (2021), 93–104; J. Atack et al., "Did railroads induce or follow economic growth? Urbanization and population growth in the American Midwest, 1850–1860", *Social Science History* 34 (2010), 171–97; B. Elleman ja S. Kotkin, *Manchurian Railways and the Opening of China: An International History* (Armonk, NY, 2010).
- 59 Ross, *Ecology and Power*, 314; P. Schmitthenner, "Colonial Hydraulic Projects in South India: Environmental and Cultural Legacy", teoksessa D. Kumar, V. Damodaran ja R. D'Souza (toim.), *The British Empire and the Natural World: Environmental Encounters in South Asia* (Oxford, 2011), 181–201.
- 60 Amrith, *Unruly Waters*, 121–4.
- 61 D. Gilmartin, *Blood and Water: The Indus River Basin in Modern History* (Berkeley, 2015), 27–68.
- 62 *Indian Industrial Commission, 1916–1918* (Calcutta, 1918), 4.
- 63 C. Brantley, "Kikuyu-Maasai Nutrition and Colonial Science: The Orr and Gilks Study in Late 1920s Kenya Revisited", *International Journal of African History* 30 (1997), 84.
- 64 J. Voelcker, *Report on the Improvement of Indian Agriculture* (Lontoo, 1893), vi; ks. myös Ross, *Ecology and Power*, 331.
- 65 Ross, *Ecology and Power*, 314.

- 66 A. Church, *East Africa, a New Dominion: A Crucial Experiment in Tropical Development and its Significance to the British Empire* (Lontoo, 1927), 114.
- 67 Ross, *Ecology and Power*, 314; D. Biggs, *Quagmire: Nation-Building and Nature in the Mekong Delta* (Seattle, 2010), 91–195.
- 68 E. Whitcombe, "The Environmental Costs of Irrigation in British India: Waterlogging, Salinity and Malaria", teoksessa Arnold and Guha (toim.), *Nature, Culture, Imperialism*, 254–6.
- 69 Beinart ja Hughes, *Environment and Empire*, 135.
- 70 Whitcombe, "Environmental Costs", 255.
- 71 Ross, *Ecology and Power*, 317.
- 72 Ibid., 71–95.
- 73 S. Barraclough ja K. Ghimire, *Forests and Livelihoods: The Social Dynamics of Deforestation in Developing Countries* (Basingstoke, 1995); M. Tiffen, M. Mortimore ja F. Gichuki, *More People, Less Erosion: Environmental Recovery in Kenya* (Chichester, 1994).
- 74 L. Hughes, *Moving the Maasai: A Colonial Misadventure* (Basingstoke, 2006).
- 75 H. Tilley, *Africa as Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870–1950* (Chicago, 2011), 124–6.
- 76 W. Churchill, "My African Journey", National Liberal Club Speech, 18.1.1908, teoksessa W. Churchill (toim.), *Winston S. Churchill: Never Give In!* (Lontoo, 1990), 22.
- 77 R. Roosevelt, *African Game Trails: An Account of the African Wanderings of an American Hunter-Naturalist* (New York, 1910), 148.
- 78 R. Horsman, *Race and Manifest Destiny: The Origins of Racial Anglo-Saxonism* (Cambridge, MA, 1981), 227 sekä *passim*; myös Belich, *Replenishing the Earth*, 5–6.
- 79 Horsman, *Race and Manifest Destiny*, 292.
- 80 Ibid., 227.
- 81 F. Harcourt, "Disraeli's imperialism, 1866–1868: a question of timing", *Historical Journal* 23 (1980), 96.
- 82 Ks. P. Satia, "Developing Iraq: Britain, India and the Redemption of Empire and Technology in the First World War", *Past & Present* 197 (2007), 228–30.
- 83 A. Anand, *Patient Assassin* (Lontoo, 2019), 218.
- 84 T. Coogan, *The Famine Plot: England's Role in Ireland's Greatest Tragedy* (New York, 2012), 229.

- 85 G. Morton-Jack, *The Indian Empire at War: From Jihad to Victory. The Untold Story of the Indian Army in the First World War* (Lontoo, 2018), 58.
- 86 E. Frankema, J. Williamson ja P. Woltjer, "An economic rationale for the West African scramble? The commercial transition and the commodity price boom of 1835–1885", *Journal of Economic History* (2018), 231–67.
- 87 G. Vanthemsche, *Belgium and the Congo, 1885–1980* (Cambridge, 2012).
- 88 B. Phillips, *Loot: Britain and the Benin Bronzes* (Lontoo, 2021), 56.
- 89 *Ibid.*, 67.
- 90 D. Hicks, *The British Museums: The Benin Bronzes, Colonial Violence and Cultural Restitution* (Lontoo, 2020).
- 91 R. Home, *City of Blood Revisited: A New Look at the Benin Expedition of 1897* (Lontoo, 1982), 111–3.
- 92 Tonkin Free School, "A Civilisation of New Learning", teoksessa Dutton, Werner ja Whitmore (toim.), *Sources of Vietnamese Tradition*, 369–71.
- 93 C. Stolte ja H. Fischer-Tiné, "Imagining Asia in India: Nationalism and Internationalism (ca. 1905–1940)", *Comparative Studies in Society and History* 54 (2012), 65–92.
- 94 Morton-Jack, *Indian Empire at War*, 16.
- 95 M. Gandhi, *Hind Swaraj and Other Writings*, toim. A. Patel (Cambridge, 1997), 131.
- 96 M. Gandhi, *The Collected Works of Mahatma Gandhi* (Delhi, 1999), 409.
- 97 G. Morton-Jack, *The Indian Empire at War: From Jihad to Victory, the Untold Story of the Indian Army in the First World War* (Lontoo, 2018), 58.
- 98 D. Weiner, *Models of Nature: Ecology, Conservation and Cultural Revolution in Soviet Russia* (Bloomington, IN, 1988), 37.
- 99 T. Weber, *Gandhi as Disciple and Mentor* (Cambridge, 2004), 69–83.
- 100 M. Gandhi, *Hind Swaraj – or Indian Home Rule* (Madras, 1921).
- 101 G. Marsh, *Man and Nature; or, Physical Geography as Modified by Human Action* (New York, 1867), 41.
- 102 L. White, "The Historical Roots of our Ecologic Crisis", *Science* 155 (1967), 1203–7.
- 103 M. Rangarajan, "Imperial Agendas and India's Forests: The Early History of Indian Forests, 1800–1878", *Indian Economic and Social History Review* 21 (1994), 147–67.
- 104 P. McElwee, *Forests Are Gold: Trees, People and Environmental Rule in Vietnam* (Seattle, 2017); ks. myös R. Guha, *The Unquiet*

- Woods: Ecological Change and Peasant Resistance in the Himalaya (Berkeley, 2000).
- 105 Saunt, *Unworthy Republic*, 136–40.
- 106 Ibid., 145.
- 107 M. Hightower, *1889: The Boomer Movement, the Land Run and Early Oklahoma City* (Norman, OK, 2018).
- 108 A. Tšehov, *The Cherry Orchard* (Lontoo, 2002). Suomentaneet Eino Kalima ja Juhani Konkka: *Kirsikkapuisto*, WSOY 1974.
- 109 Marx, *Kapital*, 3, 909. Suomentanut Antero Tiusanen: *Pääoma*, 3, Edistys 1976.
- 110 Saunt, *Unworthy Republic*, 189–97.
- 111 C. Totman, *The Green Archipelago: Forestry in Preindustrial Japan* (Berkeley, 1989); D. Fedman, *Seeds of Control: Japan's Empire of Forestry in Colonial Korea* (Seattle, 2020).
- 112 Beinart ja Hughes, *Environment and Empire*, 149–50; J. Darwin, *Unlocking the World: Port Cities and Globalization in the Age of Steam, 1830–1930* (Lontoo, 2020).
- 113 J. Daughton, *In the Forest of No Joy: The Congo-Océan Railroad and the Tragedy of French Colonialism* (New York, 2021).
- 114 Carringtonin myrskystä ks. D. Boteler, "The super storms of August/September 1859 and their effects on the telegraph system", *Advances in Space Research* 38 (2006), 159–72; R. Braithwaite, *Armageddon and Paranoia: The Nuclear Confrontation since 1945* (Oxford, 2018), 276.
- 115 W. Herschel, "Observations tending to investigate the nature of the sun, in order to find the causes or symptoms of its variable emission of light and heat, with remarks on the use that may possibly be drawn from solar observations", *Royal Society, Philosophical Transactions* 91 (1801), 265–320.
- 116 W. Jevons, *Investigations in Currency and Finance* (Lontoo, 1884), 195–243.
- 117 J. Fourier, "General Remarks on the Temperature of the Terrestrial Globe and the Planetary Spaces", *American Journal of Science and Arts* 32 (1837), 1–20.
- 118 E. Foote, "On the Heat of the Sun's Rays", *American Journal of Science and Arts*, Second series, 22 (1856), 377–83.
- 119 S. Arrhenius, "On the Influence of Carbonic Acid in the Air upon the Temperature on the Ground", *Philosophical Magazine and Journal of*

- Science*, 5th series, 41 (1896), 8–11. Ks. J. Fleming, *Historical Perspectives on Climate Change* (Oxford, 1998), 55–82.
- 120 D. Hart ja D. Victor, "Scientific Elites and the Making of US Policy for Climate Change Research, 1957–74", *Social Studies of Science* 23 (1993), 658.
- 121 S. Asselin, "A Climate of Competition: Climate Change as Political Economy in Speculative Fiction, 1889–1915", *Science Fiction Studies* 45 (2018), 440–53.
- 122 J. Fleming, *Fixing the Sky: The Checkered History of Weather and Climate Control* (New York, 2010), 31–3.
- 123 Asselin, "A Climate of Competition", 443–4.
- 124 J. Church ja N. White, "A 20th century acceleration in global sea-level rise", *Geophysical Research Letters* 33 (2006), 1–4; J. Church ja N. White, "Sea-level rise from the late 19th to the early 21st century", *Surveys in Geophysics* 32 (2011), 585–602.
- 125 J. Walker et al., "Timing of emergence of modern rates of sea-level rise by 1863", *Nature Communications* 13 (2022), 1–8.
- 126 B. Beach and W. Hanlon, "Coal Smoke and Mortality in an Early Industrial Economy", *The Economic Journal* 128 (2018), 2652–75.
- 127 R. Bailey, T. Hatton ja K. Inwood, "Atmospheric Pollution, Health, and Height in Late Nineteenth Century Britain", *Journal of Economic History* 78 (2018), 1210–47.
- 128 A. Kidd, *Manchester: A History* (Keele, 2007), 21–7.
- 129 F. Engels, *The Condition of the Working Class in England in 1844* (Lontoo, 1892), 163, 150–2, 209–10. Suomentanut Jorma Mäntylä: *Työväenluokan asema Englannissa*, Into 2015.
- 130 H. Platt, *Shock Cities: The Environmental Transformation and Reform of Manchester and Chicago* (Chicago, 2005), 24.
- 131 J. McHugh ja P. Mackowiak, "Death in the White House: President William Henry Harrison's Atypical Pneumonia", *Clinical Infectious Diseases* 59 (2014), 990–5.
- 132 W. Wordsworth, *The Excursion* (Lontoo, 1853), 300–2; J. Moore ja J. Strachan, *Key Concepts in Romantic Literature* (Lontoo, 2010), 46–51.
- 133 S. Kheraj, "The Great Epizootic of 1872–73: Networks of Animal Disease in North American Urban Environments", *Environmental History* 23 (2018), 495–521.
- 134 H. Kjekshus, *Ecology Control and Economic Development in East African History: The Case of Tanganyika, 1850 to 1950* (Lontoo, 1977), 127–43; P. Phoofolo, "Epidemics and Revolutions: The Rinderpest Epidemic in Late Nineteenth-Century Southern Africa", *Past & Present* 138 (1992), 112–43.

- 135 R. Shlomowitz, "Morality and the Pacific labour trade", *Journal of Pacific History* 22 (1987), 34–5.
- 136 D. Northrop, *Indentured Labor in the Age of Imperialism, 1843–1922* (Cambridge, 1995); R. Shlomowitz, "Epidemiology and the Pacific labor trade", *Journal of Interdisciplinary History* 19 (1989), 585–610.
- 137 E. Ladurie, "A concept: the unification of the globe by disease", *The Mind and Method of the Historian* (Brighton, 1981), 28–91.
- 138 Arnold, "Indian Ocean as a disease zone", 10–11; D. Arnold, *Colonizing the Body: State Medicine and Epidemic Disease in Nineteenth-Century India* (Berkeley, 1993).
- 139 Arnold, "Indian Ocean as a disease zone", 8–9.
- 140 A. Khalid, "Of cholera, colonialism and pilgrimage sites: Rethinking popular responses to state sanitation, c.1867–1900", teoksessa B. Pati ja M. Harrison (toim.), *Society, Medicine and Politics in Colonial India* (Lontoo, 2018), 74.
- 141 Ibid., 75.
- 142 "Mauni Amavasya: Five crore pilgrims take holy dip at Kumbh till 5 pm", *Times of India*, 4.2.2019.
- 143 Khalid, "Of cholera", 78–87.
- 144 D. Lippi ja E. Gotuzzo, "The greatest steps towards the discovery of Vibrio cholerae", *Clinical Microbiology and Infection* 60 (2014), 191–5.
- 145 M. Harrison, "A Question of Locality: The Identity of Cholera in British India, 1860–1890", teoksessa D. Arnold (toim.), *Warm Climates and Western Medicine: The Emergence of Tropical Medicine, 1500–1900* (Amsterdam, 1996), 133–59.
- 146 A. Valeron et al., "Transmissibility and geographic spread of the 1889 influenza pandemic", *PNAS* 107 (2010), 8778–81.
- 147 P. Berche, "The enigma of the 1890 Russian flu pandemic: A coronavirus?", *La Presse Médicale* 51 (2022), 1–9.
- 148 M. Brazleton, "Viral Reflections: Placing China in Global Health Histories", *Journal of Asian Studies* 79 (2020), 581–3.
- 149 N. Johnson ja J. Mueller, "Updating the accounts: global mortality of the 1918–1920 'Spanish' influenza pandemic", *Bulletin of the History of Medicine* 76 (2002), 105–15; P. Spreeuwenberg, "Reassessing the Global Mortality of the 1918 Influenza Pandemic", *American Journal of Epidemiology* 187 (2018), 2561–7.
- 150 M. Nickol ja J. Kindrachuk, "A year of terror and a century of reflection: perspectives on the great influenza pandemic of 1918–1919", *BMC Infectious Diseases* 19 (2019), 1–10.

- 151 D. Morens, J. Taubenberger ja A. Fauci, "Predominant Role of Bacterial Pneumonia as a Cause of Death in Pandemic Influenza: Implications for Pandemic Influenza Preparedness", *Journal of Infectious Diseases* 198 (2008), 962–70.
- 152 K. Clay, J. Lewis ja E. Severini, "Pollution, Infectious Disease, and Mortality: Evidence from the 1918 Spanish Influenza Pandemic", *Journal of Economic History* 78 (2018), 1179–209.
- 153 A. Guimbeau, N. Menon ja A. Musacchio, "The Brazilian Bombshell? The Long-Term Impact of the 1918 Influenza Pandemic the South American Way", NBER Working Paper 26929 (2020), 1–46.
- 154 D. Almond, "Is the 1918 Influenza Pandemic Over? Long-Term Effects of *In Utero* Influenza Exposure in the Post-1940 U.S. Population", *Journal of Political Economy* 114 (2006), 672–712.
- 155 K. Bickle, "Pandemics Change Cities: Municipal Spending and Voter Extremism in Germany, 1918–1933", Federal Reserve Bank of New York, *Staff Reports* 921 (2020), 1–34.
- 156 M. Humphries, "Paths of infection: The First World War and the origins of the 1918 influenza pandemic", *War in History* 21 (2014), 55–81; A. Erkoreka, "Origins of the Spanish influenza pandemic (1918–1920) and its relation to the First World War", *Journal of Molecular and Genetic Medicine: An International Journal of Biomedical Research* 3 (2009), 190–4.
- 157 A. More et al., "The Impact of a Six-Year Climate Anomaly on the 'Spanish Flu' Pandemic and WWI", *GeoHealth* 4 (2020), 1–8; ks. myös J. Brown et al., "Avian influenza virus in water: Infectivity is dependent on pH, salinity and temperature", *Veterinary Microbiology* 136 (2009), 20–6.
- 158 N. Lambert, *The War Lords and the Gallipoli Disaster: How Globalised Trade Led Britain to its Worst Defeat of the First World War* (Lontoo, 2021), 42–61, 202–9.
- 159 P. Castañeda Dower ja A. Markevich, "Labor Misallocation and Mass Mobilization: Russian Agriculture during the Great War", *Review of Economics and Statistics* 100 (2018), 245–59.
- 160 T. Uyama, "Why in Central Asia, why in 1916? The revolt as an interface of the Russian colonial crisis and the World War", teoksessa A. Morrison, C. Drieu ja A. Chokobaeva, *The Central Asian Revolt of 1916: A Collapsing Empire in the Age of War and Revolution* (Manchester, 2020), 27–45.
- 161 Ks. esim. M. Saul ja P. Royer, *West African Challenge to Empire, Culture and History in the Volta-Bani Anticolonial war* (Athens, OH, 2001);

- S. Chowdhury, *The First World War, Anticolonialism and Imperial Authority in British India, 1914–1924* (Lontoo, 2019); K. Jeffery, *1916: A Global History* (Lontoo, 2016), 362–4.
- 162 Jeffery, *1916*, 190–210.
- 163 D. Brantz, "Environments of Death: Trench Warfare on the Western Front, 1914–1918", teoksessa C. Closmann (toim.), *War and the Environment: Military Destruction in the Modern Age* (College Station, TX, 2009), 82.
- 164 M. Van Meirvenne et al., "Could shelling in the First World War have increased copper concentrations in the soil around Ypres?", *European Journal of Soil Science* 59 (2008), 372–9.
- 165 T. Harper, *Underground Asia: Global Revolutionaries and the Assault on Empire* (Lontoo, 2020), erityisesti 207ff.
- 166 A. Link, "That Cobb Interview", *Journal of American History* 72 (1985), 9; R. Lansing, *War Memoirs of Robert Lansing, Secretary of State* (Indianapolis, IN), 212–13.
- 167 P. Mishra, *Bland Fanatics: Liberals, Race and Empire* (Lontoo, 2020), s. 45; for Weber's legacy, ks. Allen, *British Industrial Revolution*, 7–8.
- 168 D. Low, *Eclipse of Empire* (Cambridge, 1991), II.

UUSIA UTOPIOITA RAKENTAMASSA

- 1 O. Melsted ja I. Pallua, "The Historical Transition from Coal to Hydrocarbons: Previous Explanations and the Need for an Integrative Perspective", *Canadian Journal of History* 53 (2018), 398–401.
- 2 D. Yergin, *The Prize: The Epic Quest for Oil, Money and Power* (New York, 1991), 62–149.
- 3 US Department of Commerce, *Historical Statistics of the United States, Colonial Times to 1957*, lainattu teoksessa G. Babcock, *History of the United States Rubber Company* (Indiana, IN, 1966), 419.
- 4 R. Casey, *The Model T: A Centennial History* (Baltimore, 2008).
- 5 Hankey Balfourille, 1.8.1918, PRO FO 800/204.
- 6 BP, *Statistical Review of World Energy* (2021), 16.
- 7 "Summary of Report on Near Eastern Oil", 3.2.1943, teoksessa Yergin, *The Prize*, 375.
- 8 J. Marshall, *To Have and to Have Not: Materials and the Origins of the Pacific War* (Berkeley, 2021); A. Toprani, *Oil and the Great Powers: Britain and Germany, 1914–1945* (Oxford, 2019), erityisesti 231–52.
- 9 US Energy Information Administration, "Petroleum & Other Liquids", <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=wttntus2&f=4>.

- 10 A. Bhandari, *India and the Changing Geopolitics of Oil* (Abingdon, 2022); A. Kutuleva, *China's Energy Security and Relations with Petrostates: Oil as an Idea* (Abingdon, 2022).
- 11 M. Willibold, T. Elliott ja S. Moorbat, "The tungsten isotopic composition of the Earth's mantle before the terminal bombardment", *Nature* 477 (2011), 195–8.
- 12 Oxfam America, "Valentine's Gold Jewelry Sales Generate 34 Million Tons of Mine Waste", 11.2.2005; myös A. Septoff, "How the 20 tons of mine waste per gold ring was calculated", *Earthworks*, 21.5.2004.
- 13 WALHI: Indonesian Forum for Environment, *The Environmental Impacts of Freeport–Rio Tinto's Copper and Gold Mining Operation in Papua* (Jakarta, 2006); M. Alonzo, J. Van Den Hoek ja N. Ahmed, "Capturing coupled riparian and coastal disturbance from industrial mining using cloud-resilient satellite time series analysis", *Scientific Reports* 6 (2016), 1–12.
- 14 M. Rohrbough, *Days of Gold: The California Gold Rush and the American Nation* (Berkeley, 1997); E. West, *The Contested Plains: Indians, Goldseekers, and the Rush to Colorado* (Lawrence, KS, 1998); W. Frost, "The Environmental Impacts of the Victorian Gold Rushes: Miners' Accounts during the First Five Years", *Australian Economic History Review* 53 (2013), 72–90; M. Singer et al., "Enduring legacy of a toxic fan via episodic redistribution of California gold mining debris", *PNAS* 110 (2013), 18,336–41; M. Bassin, "Expansion and Colonialism on the Eastern Frontier: Views of Siberia and the Far East in Pre-Petrine Russia", *Journal of Historical Geography* 14 (1988), 3–21.
- 15 Goldman Sachs, "Copper is the New Oil" (2021); Hinrich Foundation, "Lithium is 'new oil' as vehicle market expands", 21.9.2021; The Diplomat, "Rare Earths: Fighting for the Fuel of the Future", 8.1.2022; WSP, "Net Zero: Is Hydrogen the New Oil?", 10.11.2021; Forbes, "Data is the New Oil", 15.11.2019.
- 16 American Resources Policy Network, lainattu teoksessa "Wire Harness Recycling", *Assembly*, 1.7.2014; International Energy Agency, "The Role of Critical Minerals in Clean Energy Transitions" (2021).
- 17 Ross, *Ecology and Power*, 177–82.
- 18 Ibid., 191–3.
- 19 Ibid., 197.
- 20 A. Williams, *White Malice: The CIA and the Neocolonisation of Africa* (Lontoo, 2021), 31–2, 127.

- 21 Natural Resource Governance Institute, "The Resource Curse: The Political and Economic Challenges of Natural Resource Wealth", *NRGI Reader* (maaliskuu 2015), 1–6; M. Humphreys, J. Sachs ja J. Stiglitz (toim.), *Escaping the Resource Curse* (New York, 2007).
- 22 Williams, *White Malice*, 127.
- 23 K. Ochieng' Opalo, *Legislative Development in Africa: Politics and Postcolonial Legacies* (Cambridge, 2019).
- 24 M. Wilfahrt, *Precolonial Legacies in Postcolonial Politics: Representation and Redistribution in Decentralised West Africa* (Cambridge, 2021).
- 25 D. Euraque, *Reinterpreting the Banana Republic: Region and State in Honduras, 1870–1972* (Chapel Hill, NC, 1996), 44.
- 26 R. Immerman, *The CIA in Guatemala: The Foreign Policy of Intervention* (Austin, TX, 1982), 73–5.
- 27 Ibid., 75–80.
- 28 N. Cullather, *Secret History: The CIA's Classified Account of its Operations in Guatemala, 1952–1954* (Stanford, 1999).
- 29 G. Hegerl et al., "The early 20th century warming: Anomalies, causes, and consequences", *WIREs Climate Change* 9 (2018), 1–20.
- 30 Ibid., 5–6; ks. myös L. Svendsen et al., "Pacific contribution to decadal surface temperature trends in the Arctic during the twentieth century", *Climate Dynamics* 57 (2021), 3223–43.
- 31 J. McConnell et al., "20th-Century Industrial Black Carbon Emissions Altered Arctic Climate Forcing", *Science* 317 (2007), 1381–4; S. Brönnimann, "Early twentieth century warming", *Nature Geoscience* 2 (2009), 735–6.
- 32 S. Kim, "Expansion of Markets and the Geographic Distribution of Economic Activities: The Trends in U.S. Regional Manufacturing Structure, 1860–1987", *Quarterly Journal of Economics* 110 (1995), 881–908.
- 33 S. Kim, "Urban Development in the United States, 1690–1990", *Southern Economic Journal* 66 (2000), 855–80.
- 34 S. Broadberry ja D. Irwin, "Labor productivity in the United States and the United Kingdom during the nineteenth century", *Explorations in Economic History* 43 (2006), 257–79.
- 35 J. Atack, R. Margo ja P. Rhode, "Industrialization and Urbanization in Nineteenth Century America", NBER Working Paper 25897 (2021), 1–52.
- 36 J. Tang, "Railroad Expansion and Industrialization: Evidence from Meiji Japan", *Journal of Economic History* 74 (2014), 863–86; T. Berger, "Railroads and Rural Industrialization: Evidence from a Historical

- Project Experiment”, *Exploration in Economic History* 74 (2019), 1–18; C. Lundh, L. Schön ja L. Svensson, ”Regional wages in industry and labour market integration in Sweden, 1861–1913”, *Scandinavian Economic History Review* 53 (2005), 71–84; E. Hornung, ”Railroads and Growth in Prussia”, *Journal of the European Economic Association* 13 (2015), 699–736.
- 37 V. Lenin, *Development of Capitalism in Russia* (Moskova, 1956).
- 38 V. Lenin, Полное собрание сочинений, 55 vols (Moskova, 1975–9), 36, 15–16.
- 39 P. Josephson, ”War on Nature as Part of the Cold War: The Strategic and Ideological Roots of Environmental Degradation in the Soviet Union”, teoksessa J. McNeill ja C. Unger (toim.), *Environmental Histories of the Cold War* (Cambridge, 2010), 21–32.
- 40 D. Weiner, *A Little Corner of Freedom: Russian Nature Protection from Stalin to Gorbachev* (Berkeley, 1999), 133.
- 41 L. Trotsky, *Literature and Revolution*, toim. W. Keach (Chicago, 2005), 204.
- 42 P. Josephson, ”’Projects of the Century’ in Soviet History: Large-Scale Technologies from Lenin to Gorbachev”, *Technology and Culture* 36 (1995), 531–2.
- 43 Josephson, ”War on Nature”, 31–2; D. Nordlander, ”Origins of a Gulag Capital: Magadan and Stalinist Control in the Early 1930s”, *Slavic Review* 57 (1998), 791–812.
- 44 S. Fitzpatrick, *Stalin’s Peasants: Resistance and Survival in the Russian Village after Collectivization* (Oxford, 1994); R. Davies ja S. Wheatcroft, *The Years of Hunger: Soviet Agriculture, 1931–1933* (New York, 2004); A. Applebaum, *Red Famine: Stalin’s War on Ukraine* (Lontoo, 2017), 285.
- 45 Ks. A. Markevich, N. Naumenko ja N. Qian, ”The Political-Economic Causes of the Soviet Great Famine, 1932–3”, NBER Working Papers 29089 (2021), 1–34.
- 46 R. Davies, *The Socialist Offensive: The Collectivization of Soviet Agriculture, 1929–1930* (Cambridge, MA, 1980), 395.
- 47 N. Dronin ja E. Bellinger, *Climate Dependence and Food Problems in Russia, 1900–1990: The Interaction of Climate and Agricultural Policy and their Effect on Food Problems* (Budapest, 2005), 116; Josephson, ”’Projects of the Century’”, 533.
- 48 B. Bonhomme, *Forests, Peasants, and Revolutionaries: Forest Conservation and Organization in Soviet Russia, 1917–1929* (Boulder, CO, 2005), 128.
- 49 S. Brain, ”Stalin’s Environmentalism”, *Russian Review* 69 (2010), 98.

- 50 S. Brain, "The Environmental History of the Soviet Union", teoksessa J. McNeill ja E. Mauldin (toim.), *A Companion to Global Environmental History* (Chichester, 2012), 232.
- 51 Brain, "Stalin's Environmentalism", 104.
- 52 Ibid., 102.
- 53 Weiner, *Models of Nature*, 252–6.
- 54 Brain, "Stalin's Environmentalism", 110–11.
- 55 Josephson, "'Projects of the Century'", 536.
- 56 I. Gazeley ja A. Newell, "The First World War and working-class food consumption in Britain", *European Review of Economic History* 17 (2013), 71–94.
- 57 E. Frankema, "Raising revenue in the British empire, 1870–1940: how 'extractive' were colonial taxes?", *Journal of Global History* 5 (2010), 447–77.
- 58 K. O'Connor, "The King's Christmas pudding: globalization, recipes, and the commodities of empire", *Journal of Global History* 4 (2009), 127–55.
- 59 Ross, *Ecology and Power*, 339; M. van Beusekom, *Negotiating Development: African Farmers and Colonial Experts at the Office du Niger* (Portsmouth, NH, 2002), 40–2.
- 60 Ross, *Ecology and Power*, 339.
- 61 J. van Zanden, "The first green revolution: the growth of production and productivity in European agriculture, 1870–1914", *Economic History Review* 44 (1991), 21–39.
- 62 N. Cullather, *The Hungry World: America's Cold War Battle against Poverty in Asia* (Cambridge, MA, 2022), 46–7.
- 63 B. Cook, R. Miller ja R. Seager, "Amplification of the North American 'Dust Bowl' drought through human-induced land degradation", *PNAS* 106 (2009), 4997–5001.
- 64 W. Lockeretz, "The Lessons of the Dust Bowl: Several Decades before the Current Concern with Environmental Problems, Dust Storms Ravaged the Great Plains, and the Threat of More Dust Storms Still Hangs over Us", *American Scientist* 66 (1978), 560.
- 65 T. Egan, *The Worst Hard Time: The Untold Story of Those Who Survived the Great American Dust Bowl* (Boston, MA, 2006), 8; D. Worster, *Dust Bowl: The Southern Plains in the 1930s* (New York, 1979).
- 66 R. Hornbeck, "The Enduring Impact of the American Dust Bowl: Short- and Long-Run Adjustments to Environmental Catastrophe", *American Economic Review* 102 (2012), 1477–1507.

- 67 K. Sylvester ja E. Rupley, "Revising the Dust Bowl: High above the Kansas Grasslands", *Environmental History* 17 (2012), 603–33.
- 68 T. Cowan et al., "Factors Contributing to Record-Breaking Heat Waves over the Great Plains during the 1930s Dust Bowl", *Journal of Climate* 30 (2017), 2437–61.
- 69 M. Sanderson ja R. Scott Frey, "From desert to breadbasket ... to desert again? A metabolic rift in the High Plains Aquifer", *Journal of Political Ecology* 21 (2014), 516–32.
- 70 H. Holleman, *Dust Bowls of Empire: Imperialism, Environmental Politics, and the Injustice of "Green" Capitalism* (New Haven, 2018), 47–50.
- 71 G. Jacks ja R. Whyte, *The Rape of the Earth: A World Survey of Soil Erosion* (Lontoo, 1939), 18–26.
- 72 L. Stamp, "Land Utilization and Soil Erosion in Nigeria", *Geographical Review* 28 (1938), 32–45.
- 73 G. Callendar, "The artificial production of carbon dioxide and its influence on temperature", *Quarterly Journal of the Royal Meteorological Society* 64 (1938), 223–37.
- 74 E. Hawkins ja P. Jones, "On increasing global temperatures: 75 years after Callendar", *Quarterly Journal of the Royal Meteorological Society* 139 (2013), 1961–3.
- 75 S. Tett et al., "Causes of twentieth-century temperature change near the Earth's surface", *Nature* 399 (1999), 569–72; T. Delworth ja T. Knutson, "Simulation of early 20th century global warming", *Science* 287 (2000), 2246–50.
- 76 O. Johannsson, "Die Temperaturverhältnisse Spitzbergens (Svalbard)", *Annalen der Hydrographie und Maritimen Meteorologie* 64 (1936), 81–96; R. Scherhag, "Die Erwärmung des Polargebiets", *Annalen der Hydrographie* 67 (1939), 57–67.
- 77 J. Williams, *Turning to Nature in Germany: Hiking, Nudism and Conservation* (Stanford, 2007), 220.
- 78 Ibid.
- 79 F. Uekoetter, *The Green and the Brown: A History of Conservation in Nazi Germany* (Cambridge, 2009), 22; Williams, *Turning to Nature*, 219.
- 80 Williams, *Turning to Nature*, 231.
- 81 Uekoetter, *The Green and the Brown*, 31.
- 82 Williams, *Turning to Nature*, 252.
- 83 Uekoetter, *The Green and the Brown*, 1.
- 84 Ibid., 41.
- 85 Williams, *Turning to Nature*, 252.
- 86 Uekoetter, *The Green and the Brown*, 41.

- 87 T. Zeller, "Molding the Landscape of Nazi Environmentalism: Alwin Seifert and the Third Reich", teoksessa Brüggemeier, Cioc ja Zeller (toim.), *How Green Were the Nazis?*, 147–70.
- 88 Uekoetter, *The Green and the Brown*, 32, 171–6; T. Zeller, "'The Landscape's Crown': Landscape, Perceptions, and Modernizing Effects of the German Autobahn System, 1934 to 1941", teoksessa D. Nye (toim.), *Technologies of Landscape: From Reaping to Recycling* (Amherst, MA, 1999), 230.
- 89 Uekoetter, *The Green and the Brown*, 32.
- 90 A. Whiston Spirn, *The Language of Landscape* (New Haven, 1998), 246.
- 91 Ibid.
- 92 J. Wolschke-Bulmahn, "Violence as the Basis of National Socialist Landscape Planning in the 'Annexed Eastern Areas'", teoksessa Brüggemeier, Cioc ja Zeller (toim.), *How Green Were the Nazis?*, 244.
- 93 Ibid., 247.
- 94 Ibid., 246–7.
- 95 J. Wolschke-Bulmahn ja G. Gröning, "The National Socialist Garden and Landscape Ideal: Bodenständigkeit (Rootedness in the Soil)", teoksessa R. Eltin (toim.), *Art, Culture, and Media under the Third Reich* (Chicago, 2002), 80–3; Wolschke-Bulmahn, "Violence as the Basis", 245.
- 96 Reichsführer SS, *Der Untermensch* (Berliini, 1942), 2; Wolschke-Bulmahn, "Violence as the Basis", 245.
- 97 H. Klemann ja S. Kudryashov, *Occupied Economies: An Economic History of Nazi-Occupied Europe, 1939–1945* (Lontoo, 2012); ks. myös A. Tooze, *The Wages of Destruction: The Making and Breaking of the Nazi Economy* (Lontoo, 2006).
- 98 Frankopan, *Silk Roads*, 386–7 (*Silkkitiet*). Ennen kaikkea ks. A. Beevor, *Stalingrad* (Lontoo, 1998). Suomentanut Matti Kinnunen: *Stalingrad*, WSOY 2012; D. Stahel; *Kiev 1941: Hitler's Battle for Supremacy in the East* (Cambridge, 2012).
- 99 J. Nehru, *The Discovery of India* (New Delhi, 1981), 16.
- 100 A. Sen, *Poverty and Famines: An Essay on Entitlement and Deprivation* (Oxford, 1983), erityisesti 52–85.
- 101 A. Sen, "Famines as failures of exchange entitlements", *Economic and Political Weekly* 11 (1976), 1273–80; M. Tauger, "The British famine crises of World War II", *British Scholar* 1 (2009), 421–40; V. Mishra et al., "Drought and Famine in India, 1870–2016", *Geophysical Research Letters* 46 (2019), 2075–83.

- 102 A. Speer, *Inside the Third Reich*, kään. R. ja C. Winston (Lontoo, 1970), 317.
- 103 E. Konopinski, C. Marvin ja E. Teller, *Ignition of the Atmosphere with Nuclear Bombs: Report LA-602* (Los Alamos, NM, 1946), 1.
- 104 Y. Fujii, "The role of atmospheric nuclear explosions on the stagnation of global warming in the mid 20th century", *Journal of Atmospheric and Solar-Terrestrial Physics* 73 (2011), 643–52.
- 105 T. Higuchi, "Atmospheric Nuclear Weapons Testing and the Debate on Risk Knowledge in Cold War America, 1945–1963", teoksessa McNeill ja Unger (toim.), *Environmental Histories*, 305–6.
- 106 A. Robock ja B. Zambri, "Did Smoke from City Fires in World War II Cause Global Cooling?", *Journal of Geophysical Research: Atmospheres* 123 (2018), 314–25.
- 107 Ibid.
- 108 Hegerl, "The early 20th century warming", 15; J. Hansen et al., "Global Surface Temperature Change", *Reviews of Geophysics* 48 (2010), 1–29.
- 109 M. Dörries, "The Politics of Atmospheric Sciences: 'Nuclear Winter' and Global Climate Change", *Osiris* 26 (2011), 202.
- 110 H. Arakawa, "Possible Atmospheric Disturbances and Damages to the Rice-Crops in Northern Japan That May Be Caused by Experimentation with Nuclear Weapons", *Geophysical Magazine* (1954), 125–34; H. Arakawa ja K. Tsutsumi, "A decrease in the normal incidence radiation values for 1953 and 1954 and its possible cause", *Geophysical Magazine* 27 (1956), 205–8; Dörries, "Politics of Atmospheric Sciences", 202.
- 111 US Atomic Energy Commission, US Air Force and Rand Corporation, "Worldwide Effects of Atomic Weapons: Project Sunshine", R-251-AEC, 6.8.1953.
- 112 P. Edwards, "Entangled histories: Climate science and nuclear weapons research", *Bulletin of the Atomic Scientists* 68 (2012), 29–30.
- 113 Committee on Meteorological Aspects of the Effects of Atomic Radiation, "Meteorological Aspects of Atomic Radiation", *Science* 124 (1956), 105–12.
- 114 Ibid., 112.
- 115 Laajemasta ilmastonmuutoskeskustelusta 1900-luvulla ks. M. Dörries, "In the public eye: Volcanology and climate change studies in the 20th century", *Historical Studies in the Physical and Biological Sciences* 37 (2006), 87–125.
- 116 Fujii, "Role of atmospheric nuclear explosions", 643–52.

YMPÄRISTÖN MUOKKAAJAT

- 1 J. Fleming, "The pathological history of weather and climate modification: Three cycles of promise and hype", *Historical Studies in the Physical and Biological Sciences* 37 (2006), 6–7. Luvun alun lainaus on teoksesta J. Shapiro, *Mao's War against Nature: Politics and the Environment in Revolutionary China* (Cambridge, 2001), 87.
- 2 Fleming, "Pathological history", 6–7; J. Townsend, *Making Rain in America: A History* (Lubbock, TX, 1975), 11–13.
- 3 Fleming, *Fixing the Sky*, 77–108.
- 4 P. Heazell, *Most Secret: The Hidden History of Orford Ness* (Stroud, 2013), 40.
- 5 K. Harper, *Weather by the Numbers: The Genesis of Modern Meteorology* (Oxford, 2008), 49–52.
- 6 K. Harper, *Make It Rain: State Control of the Atmosphere in Twentieth-Century America* (Chicago, 2017), 37–48.
- 7 Harper, *Weather by the Numbers*, 58.
- 8 Harper, *Make It Rain*, 46–8.
- 9 V. Schaefer, "A Method for Making Snowflake Replicas", *Science* 93 (1941), 239–40; B. Vonnegut, "The nucleation of ice formation by silver iodide", *Journal of Applied Physics* 18 (1947), 593–5; I. Langmuir, "The production of a chain reaction in cumulus clouds at temperatures above freezing", *Journal of Meteorology* 5 (1948), 175–81.
- 10 K. Harper, "Climate control: United States weather modification in the cold war and beyond", *Endeavour* 32 (2008), 20; Harper, *Make It Rain*, 49.
- 11 Harper, "Climate control", 20.
- 12 K. Harper ja R. Doel, "Environmental Diplomacy in the Cold War: Weather Control, the United States and India, 1966–1967", teoksessa McNeill ja Unger (toim.), *Environmental Histories*, 119; Harper, *Make It Rain*, 56–62.
- 13 *Time*, 28.8.1950.
- 14 *Charleston Daily Mail*, 11.12.1950.
- 15 "Weather Made to Order?", *Collier's*, 28.5.1954.
- 16 *Brainerd Daily Dispatch*, 6.7.1954.
- 17 H. Orville, "The Impact of Weather Control on the Cold War", *Weather Modification Research: Hearings of the House Committee on Interstate and Foreign Commerce* (Washington, DC, 1958), 53.
- 18 Harper, *Make It Rain*, 62–80.
- 19 "US is Urged to Seek Methods to Control the World's Weather", *New York Times*, 1.1.1958.

- 20 H. Houghton, "Present position and future possibilities of weather control", teoksessa *Final Report of the United States Advisory Committee on Weather Control*, lainattu teoksessa Fleming, "Pathological history", 17–18.
- 21 M. Brzezinski, *Red Moon Rising: Sputnik and the Hidden Rivalries that Ignited the Space Age* (New York, 2007).
- 22 H. Plaster, "Snooping on Space Pictures", *Studies in Intelligence* 8 (1964), 31–9.
- 23 S. Wheatcroft, "The Soviet Famine of 1946–1947, the Weather and Human Agency in Historical Perspective", *Europe-Asia Studies* 64 (2012), 987–1005.
- 24 M. Ellman, "The 1947 Soviet famine and the entitlement approach to famines", *Cambridge Journal of Economics* 24 (2000), 603–30. Ks. myös V. Zima, Голод в СССР 1946–1947 годов: происхождение и последствия (Moskova, 1996) ja N. Ganson, *The Soviet Famine of 1946–1947 in Global and Historical Perspective* (New York, 2009).
- 25 S. Brain, "The Great Stalin Plan for the Transformation of Nature", *Environmental History* 15 (2010), 680.
- 26 J. Stalin, "Dialectical and Historical Materialism", teoksessa J. Stalin, *Problems of Leninism* (Moskova, 1947), 482.
- 27 S. Brain, *Song of the Forest: Russian Forestry and Stalinist Environmentalism, 1905–1953* (Pittsburgh, 2011), 148–67.
- 28 Ibid., 149.
- 29 D. Shaw, "Mastering Nature through Science: Soviet Geographers and the Great Stalin Plan for the Transformation of Nature, 1948–53", *Slavonic and East European Review* 93 (2015), 120–46.
- 30 Brain, "The Great Stalin Plan", 691–2.
- 31 N. Hrušťov, "Special Report to the 20th Congress of the Communist Party of the Soviet Union", 24–25.2.1956, teoksessa B. Nicolaevsky (toim.), *The Crimes of the Stalin Era* (New York, 1956), 58.
- 32 Ibid., 13, 59.
- 33 L. Battan, "A Survey of Recent Cloud Physics Research in the Soviet Union", *Bulletin of the American Meteorological Society* 44 (1963), 755–71.
- 34 Orville, "Impact of Weather Control on the Cold War", 51–3.
- 35 Ibid.
- 36 Luonnos presidentin puheeksi YK:n yleiskokouksessa, 28.11.1953, Eisenhower Presidential Library.
- 37 G. DeGroot, *Dark Side of the Moon: The Magnificent Madness of the American Lunar Quest* (Lontoo, 2007), 10.

- 38 E. Teller, "We're Going to Work Miracles", *Popular Mechanics* 113 (1960), 97–101; "How to Be an Optimist in a Nuclear Age", teoksessa E. Teller sekä A. Brown, *The Legacy of Hiroshima* (New York, 1962), 84–9; D. O'Neill, *The Firecracker Boys: H-Bombs, Inupiat Eskimos, and the Roots of the Environmental Movement* (New York, 1994), 28.
- 39 Fleming, "Pathological history", 18–19. See A. Markin, *Soviet Electric Power: Developments and Prospects* (Moskova, 1956), 133–5; N. Rusin ja L. Flit, (Moskova, 1960).
- 40 I. Adabashev, *Global Engineering* (Moskova, 1966), 191–7, 162.
- 41 Ibid., 198–201; 237.
- 42 J. Hamblin, "A Global Contamination Zone: Early Cold War Planning for Environmental Warfare", teoksessa McNeill ja Unger (toim.), *Environmental Histories*, 103, 95.
- 43 US Senate Committee on Interior and Insular Affairs, *Hearings before the Subcommittee on Water and Power Resources* (Washington, DC, 1966), 26–7.
- 44 L. Reiffel et al, "A Study of Lunar Research Flights", Air Force Special Weapons Center (Defense Documentation Center for Air Research and Development Command, Kirtland Air Force Base, NM, 1959), 2–3.
- 45 J. von Neumann, "Can We Survive Technology?" teoksessa A. Taub (toim.), *John von Neumann: The Collected Works*, 6 vols (Oxford, 1961–3), 6, 504–19.
- 46 S. Weart, *The Rise of Nuclear War* (Cambridge, MA, 1988), 121.
- 47 Teller, "How to Be an Optimist in a Nuclear Age", 86–7.
- 48 J. Fay, *Inhospitable World: Cinema in the Time of the Anthropocene* (Oxford, 2018), 80–3.
- 49 Harper ja Doel, "Environmental Diplomacy", 120–1; "High Altitude Tests Stirs Wide Protests", *New York Times*, 1.6.1962; J. Manaffey, *Atomic Awakening: A New Look at the History and Future of Nuclear Power* (New York, 2009), 233–4.
- 50 V. Tolstikov ja V. Kuznetsov, "Кыштымская радиационная авария 1957 года: первые оценки радиационной обстановки после взрыва", Глобальная ядерная безопасность 201 (2018), 107–15.
- 51 G. Seaborg, *Kennedy, Khrushchev and the Test Ban* (Berkeley, 1981); R. Strode, "Soviet Policy toward a Nuclear Test Ban: 1958–1963", teoksessa M. Mandelbaum (toim.), *The Other Side of the Table: The Soviet Approach to Arms Control* (New York, 1990), 5–40.
- 52 R. Huschke, "A Brief History of Weather Modification since 1946", *Bulletin of the American Meteorological Society* 44 (1963), 428.

- 53 J. Perkins, *Geopolitics and the Green Revolution: Wheat, Genes and the Cold War* (Oxford, 1997), 163.
- 54 Ibid., 166–8.
- 55 Amrith, *Unruly Waters*, 194–6; Central Water and Power Commission, *Major Water and Power Projects of India* (Delhi, 1957), 3.
- 56 S. Singh, *Taming the Waters: The Political Economy of Large Dams in India* (Oxford, 1997), 133–203; Amrith, *Unruly Waters*, 212–13.
- 57 Cullather, *Hungry World*, 109.
- 58 A. Rotter, *Comrades at Odds: The United States and India, 1947–64* (Ithaca, NY, 2000), 15–16.
- 59 Cullather, *Hungry World*, 112.
- 60 Amrith, *Unruly Waters*, 184–6; "Certified Statement in Accordance with Article 2 of the Regulations Adopted by the General Assembly on 14.12.1946 (Resolution No. 97 (I)) to Give Effect to Article 102 of the Charter of the United Nations".
- 61 D. Lilienthal, "Another Korea in the Making?", *Collier's*, 4.8.1951, 18–20.
- 62 Cullather, *Hungry World*, 112–13.
- 63 V. Nemenchok, "'That So Fair a Thing Should Be So Frail': The Ford Foundation and the Failure of Rural Development in Iran, 1953–1964", *Middle East Journal* 63 (2009), 263–71.
- 64 Ibid., 263–84.
- 65 Ks. Frankopan, *Silk Roads*, 433 (*Silkkitiet*).
- 66 Cullather, *Hungry World*, 125–7.
- 67 S. Hamilton, *Supermarket USA: Food and Power in the Cold War Farms Race* (New Haven, 2018), 70–96.
- 68 Harry S. Truman, "Inaugural address", *New York Times*, 21.1.1949.
- 69 Ibid.
- 70 National Security Council, "NSC-48, the Position of the United States with Respect to Asia", 30.12.1949, teoksessa T. Etzold ja J. Gaddis (toim.), *Containment: Documents on American Policy and Strategy* (New York, 1978), 265.
- 71 H. Byroade, "The World's Colonies and Ex-Colonies: A Challenge to America", lainattu teoksessa Cullather, *Hungry World*, 74.
- 72 Cullather, *Hungry World*, 79; D. Faris, *To Plow with Hope* (New York, 1958), 107.
- 73 Perkins, *Geopolitics and the Green Revolution*, 146–54, 119–20.
- 74 Hamilton, *Supermarket USA*, 18–19; P. Conkin, *A Revolution Down on the Farm: The Transformation of American Agriculture since 1929* (Lexington, KT, 2008).

- 75 A. Hale-Dorrell, *Corn Crusade: Khrushchev's Farming Revolution in the Post-Stalin Soviet Union* (New York, 2019), 36.
- 76 H. Luce, "The American Century", *Life*, 17.2.1941; Hamilton, *Supermarket USA*, 44.
- 77 Truman, "Inaugural address".
- 78 Cullather, *Hungry World*, 142.
- 79 M. Swaminathan, *Wheat Revolution: A Dialogue* (Lontoo, 1993), p. vii; Perkins, *Geopolitics and the Green Revolution*, 168.
- 80 Cullather, *Hungry World*, 144–5.
- 81 Ibid., 142–6.
- 82 Perkins, *Geopolitics and the Green Revolution*, 175.
- 83 Ibid.; F. Frankel, *India's Political Economy, 1947–1977* (Princeton, 1978), 157–9.
- 84 J. Nehru, *Toward Freedom: The Autobiography of J. Nehru* (New York, 1941), 230–1; S. Gopal, *Jawaharlal Nehru: A Biography*, 3 vols (Lontoo, 1975–84), 2, 202; D. Engerman, "The Romance of Economic Development and New Histories of the Cold War", *Diplomatic History* 28 (2004), 30–1.
- 85 Hale-Dorrell, *Corn Crusade*, 48–52.
- 86 Ks. esim. N. Telepneva, *Cold War Liberation: The Soviet Union and the Collapse of the Portuguese Empire in Africa, 1961–75* (Chapel Hill, NC, 2022); R. Yordanov, *The Soviet Union and the Horn of Africa during the Cold War* (Lanham, MD, 2016); C. Katsakoris, "The Soviet-South Encounter: Tensions in the Friendship with Afro-Asian Partners, 1945–65" teoksessa P. Babiracki ja K. Zimmer (toim.), *Cold War Crossings: International Travel and Exchange across the Soviet Bloc* (College Station, TX, 2014), 134–65.
- 87 Ibid., 48–54; Aswanista ks. A. Shokr, "Hydropolitics, Economy, and the Aswan High Dam in Mid-Century Egypt", *Arab Studies Journal* 17 (2009), 9–31; S. Borzutzky ja D. Berger, "Dammed If You Do, Dammed If You Don't: The Eisenhower Administration and the Aswan Dam", *Middle East Journal* 64 (2010), 84–102.
- 88 Hale-Dorrell, *Corn Crusade*, 20.
- 89 Ibid., 22.
- 90 Dronin ja Bellinger, *Climate Dependence and Food Problems in Russia, 1711–217*.
- 91 A. Hale-Dorrell, "The Soviet Union, the United States, and Industrial Agriculture", *Journal of World History* 26 (2015), 305–6.
- 92 Hale-Dorrell, *Corn Crusade*, 21, 61–2.
- 93 Ibid., 1–2.

- 94 W. Taubman, *Khrushchev: The Man and his Era* (New York, 2003), 609; Hale-Dorrell, "The Soviet Union, the United States, and Industrial Agriculture", 318.
- 95 N. Hruščov, Строительство коммунизма в СССР и сельское хозяйство, 8 vols (Moskova, 1962–8), 1, 342, lainattu teoksessa Hale-Dorrell, *Corn Crusade*, 29.
- 96 Hruščov, Строительство коммунизма, 2, 69, lainattu teoksessa Hale-Dorrell, *Corn Crusade*, 95.
- 97 Hale-Dorrell, "The Soviet Union, the United States, and Industrial Agriculture", 309–11.
- 98 Dronin ja Bellinger, *Climate Dependence and Food Problems in Russia*, 1–2; P. Gatrell, *The Tsarist Economy, 1850–1917* (Lontoo, 1986); N. Field, "Environmental quality and land productivity: a comparison of the agricultural land base of the USSR and North America", *Canadian Geographer* 12 (1968), 1–14.
- 99 Hamilton, *Supermarket USA*, 126.
- 100 Hale-Dorrell, *Corn Crusade*, 33.
- 101 Hamilton, *Supermarket USA*, 119.
- 102 N. Hruščov, *Memoirs of Nikita Khrushchev*, toim. S. Hruščov, käant. G. Shriver, 3 vols (University Park, PA, 2004–7), 2, 558; myös Hale-Dorrell, *Corn Crusade*, 30.
- 103 Engerman, "Romance of Economic Development", 23–54.
- 104 S. Reid, "The Khrushchev Kitchen: Domesticating the Scientific-Technological Revolution", *Journal of Contemporary History* 40 (2005), 289–316.
- 105 D. Stone, *Goodbye to All That: A History of Europe since 1945* (Oxford, 2014), 153–5; S. Reid, "'Our Kitchen Is Just as Good': Soviet Responses to the American Kitchen", teoksessa R. Oldenziel ja K. Zachmann (toim.), *Cold War Kitchen: Americanization, Technology and European Users* (Cambridge, MA, 2009), 83–112.
- 106 Ks. M. Feshbach ja A. Friendly, *Ecocide in the USSR: Health and Nature under Siege* (New York, 1992), 73–90.
- 107 B. Gaybullaev, S.-C. Chen ja D. Gaybullaev, "Changes in water volume of the Aral Sea after 1960", *Applied Water Science* 2 (2012), 285–6; B. Alikhanov, "Environmental challenges of the Aral Sea and the Aral Sea area", International Meeting Report, Tashkent (2010), 5–27; D. Alieva, "Reproductive health in females of the Aral Sea area", *Gynecology and Obstetrics* 70 (2008), 64.
- 108 P. Micklin, "The Aral Sea Disaster", *Annual Review of Earth Planetary Sciences* 35 (2007), 47–72.

- 109 Hamilton, *Supermarket USA*, 181.
- 110 Hale-Dorrell, *Corn Crusade*, 1–9.
- 111 F. Dikötter, *The Tragedy of Liberation: A History of the Chinese Revolution, 1945–1957* (Lontoo, 2013), 9–11.
- 112 Ibid., 15–16.
- 113 Ibid., 17–19.
- 114 Ibid., 22–6.
- 115 Sun Yat-sen, *The True Solution for the Chinese Question* (New York, 1904), 9–10.
- 116 Sun Yat-sen, *Vital Problems of China* (Taipei, 1953), 80.
- 117 Sun Yat-sen, "The Three Principles of the People", teoksessa D. Chetham, *Before the Deluge* (Lontoo, 2002), 117.
- 118 Dikötter, *Tragedy of Liberation*, 137.
- 119 Ibid.
- 120 Ibid., 126–7.
- 121 Ibid., 49, 87–94.
- 122 Ibid., 275–7.
- 123 Ibid., 281–91.
- 124 L. Cabral, P. Pandey ja X. Xu, "Epic narratives of the Green Revolution in Brazil, China, and India", *Agriculture and Human Values* 39 (2022), 253.
- 125 Shapiro, *Mao's War against Nature*, 67–8.
- 126 Ibid., 68.
- 127 Ibid., 67–8.
- 128 Ibid., 71–2.
- 129 Ibid., 67–74.
- 130 Ibid., 23, 49, 63.
- 131 Ibid., 106–7.
- 132 M. Muscolino, "'Water Has Aroused the Girls' Hearts': Gendering Water and Soil Conservation in 1950s China", *Past & Present* 255 (2022), 351–87.
- 133 Ibid., 29–31.
- 134 Dikötter, *Tragedy of Liberation*, 144.
- 135 Shapiro, *Mao's War against Nature*, 86–7.
- 136 B. Maohong, "The Evolution of Environmental Problems and Environmental Policy in China: The Interaction of Internal and External Forces", teoksessa McNeill ja Unger (toim.), *Environmental Histories of the Cold War*, 328.
- 137 Shapiro, *Mao's War against Nature*, 75, 89.
- 138 J. Becker, *Hungry Ghosts: Mao's Secret Famine* (New York, 1996), 2.

- 139 Ball, *Water Kingdom*, 225.
- 140 M. Wolfe, "'A Revolution is a Force More Powerful Than Nature': Extreme Weather and the Cuban Revolution, 1959–64", *Environmental History* 24 (2020), 469–91.
- 141 E. Borgwardt, *A New Deal for the World: America's Vision for Human Rights* (Cambridge, MA, 2005), 157.

YLTYVÄN HUOLEN AIKA

- 1 M. Mead, *Culture and Commitment: A Study of the Generation Gap* (Garden City, NY, 1970), 58–9.
- 2 J. Kerouac, *The Dharma Bums* (New York, 1958), 97–8. Suomentanut Markus Jääskeläinen: *Dharma-pummit*, Sammakko 2001; A. Rome, "'Give Earth a Chance': The Environmental Movement and the Sixties", *Journal of American History* 90 (2003), 543.
- 3 J. Willis, *Daily Life in the 1960s Counterculture* (Santa Barbara, CA, 2019), 147.
- 4 V. Intondi, *African Americans Against the Bomb: Nuclear Weapons, Colonialism and the Black Freedom Movement* (Stanford, CA, 2015).
- 5 Rome, "Give Earth a Chance", 536.
- 6 Higuchi, "Atmospheric Nuclear Weapons Testing", 318.
- 7 C. Merchant, "Women of the Progressive Conservation Movement: 1900–1916", *Environmental Review* 8 (1984), 57–85.
- 8 V. Norwood, *Made from This Earth: American Women and Nature* (Chapel Hill, NC, 1993), 143–4; M. Ryan, *Womanhood in America, from Colonial Times to the Present* (New York, 1975), 281.
- 9 Rome, "Give Earth a Chance", 538.
- 10 R. Carson, *Silent Spring* (Cambridge, MA, 1962), 1–2. Suomentanut Pertti Jotuni: *Äänerton kevät*, Tammi 1963. Ks. myös Norwood, *Made from This Earth*, 143–71.
- 11 Carson, *Silent Spring*, 16 (Äänerton kevät).
- 12 Norwood, *Made from This Earth*, 154; Rome, "'Give Earth a Chance'", 532.
- 13 Rome, "'Give Earth a Chance'", 528.
- 14 J. Galbraith, *The Affluent Society* (Cambridge, MA, 1958), 253.
- 15 E. Dale, "Big Debate: Public vs Private Spending", *New York Times*, 13.3.1960.
- 16 S. Udall, *The Quiet Crisis* (New York, 1963), viii, 189; Rome, "Give Earth a Chance", 532.
- 17 Presidentti Lyndon B. Johnson, "Remarks at the University of Michigan, May 22, 1964", teoksessa *Public Papers of the Presidents of the United*

- States: Lyndon B. Johnson, 1963–1964*, 2 vols (Washington, DC, 1965), I, 704–5.
- 18 Yhdysvaltain maavoimat, "Proceedings of the First Defoliation Conference, 29–30 July 1963" (Fort Detrick, MD, 1964).
 - 19 E. Pfeiffer ja G. Orians, "Military Use of Herbicides in Vietnam", teoksessa J. Neilands et al. (toim.), *Harvest of Death: Chemical Warfare in Vietnam and Cambodia* (New York, 1972), 120–1.
 - 20 J. Cookson ja J. Nottingham, *A Survey of Chemical and Biological Warfare* (New York, 1969), 42–3.
 - 21 A. Galston et al., "Scientists' Petition to President Johnson against Herbicidal Warfare", *Bioscience* 17 (1967), 10.
 - 22 D. Zierler, *The Invention of Ecocide: Agent Orange, Vietnam and the Scientists who Changed the Way We Think about the Environment* (Athens, GA, 2011), 14–32.
 - 23 R. Olney, *Black Tide: The Santa Barbara Oil Spill and its Consequences* (New York, 1972).
 - 24 G. Hill, "One Year Later, Impact of Great Oil Slick is Still Felt", *New York Times*, 25.I.1970.
 - 25 D. Stradling ja R. Stradling, "Perceptions of the Burning River: Deindustrialization and Cleveland's Cuyahoga River", *Environmental History* 13 (2008), 517–18.
 - 26 Ibid., 523.
 - 27 Presidentti Richard Nixon, "Remarks Following Inspection of Oil Damage at Santa Barbara Beach", 21.3.1969, teoksessa *Public Papers of the Presidents of the United States: Richard Nixon, 1969* (Washington, DC, 1971), 234.
 - 28 G. Hill, "'Environmental Crisis' May Eclipse Vietnam as College Issue", *New York Times*, 30.II.1969.
 - 29 A. Rome, *The Genius of Earth Day: How a 1970 Teach-in Unexpectedly Made the First Green Generation* (New York, 2013).
 - 30 A. Cooke, "The US gets down to Earth", *Guardian*, 24.4.1970.
 - 31 Hill, "One Year Later".
 - 32 M. Melosi, "Lyndon Johnson and Environmental Policy", teoksessa R. Divine (toim.), *The Johnson Years*, vol. 2: *Vietnam, the Environment, and Science* (Lawrence, KA, 1987), 113–49; M. Melosi, *Effluent America: Cities, Industry, Energy and the Environment* (Pittsburgh, 2001), 254–5.
 - 33 J. Brooks Flippen, *Nixon and the Environment* (Albuquerque, NM, 2000); Rome, "Give Earth a Chance", 551–2; T. Spezio, *Slick*

- Policy: Environmental and Science Policy in the Aftermath of the Santa Barbara Oil Spill* (Pittsburgh, 2018).
- 34 Dörries, "Politics of Atmospheric Sciences", 206.
- 35 B. Ward ja R. Dubos, *Only One Earth: The Care and Maintenance of a Small Planet* (New York, 1972), 192, 195.
- 36 Ibid., p. xiii.
- 37 I. Gandhi, "Man and Environment", teoksessa I. Gandhi, *Safeguarding Environment* (New Delhi, 1984), 13–22.
- 38 John F. Kennedy Presidential Library, "Inaugural Address", 20.1.1961.
- 39 Presidentti Harry S. Truman, "America's Solemn Obligation in World Famine Crisis", *Department of State Bulletin* 14 (1946), 716.
- 40 CIA, *Potential Implications of Trends in World Population, Food Production, and Climate* (Washington, DC, 1974), 6.
- 41 E. East, *Mankind at the Crossroads* (New York, 1923); W. Thompson, *Population and Peace in the Pacific* (Chicago, 1946); W. Vogt, *Road to Survival* (New York, 1948); F. Osborn, *Our Plundered Planet* (Boston, MA, 1948); ks. myös Perkins, *Geopolitics and the Green Revolution*, 135–7.
- 42 Perkins, *Geopolitics and the Green Revolution*, 137.
- 43 Ibid., 138; Cullather, *Hungry World*, 154.
- 44 Truman, "America's Solemn Obligation", 716.
- 45 P. Ehrlich, *The Population Bomb* (New York, 1968), p. xii; ks. myös P. Ehrlich ja A. Ehrlich, "The Population Bomb Revisited", *Electronic Journal of Sustainable Development* 1 (2009), 63–71.
- 46 S. Sontag, "What's Happening to America", *Partisan Review* 34 (1967), 57–8; Rome, "Give Earth a Chance", 547.
- 47 N. Cullather, "Parable of Seeds: The Green Revolution in the Modernizing Imagination", teoksessa M. Frey, R. Pruessen ja T. Yong (toim.), *The Transformation of Southeast Asia: International Perspectives on Decolonization* (Armonk, NY, 2003), 265.
- 48 G. Stone, "Commentary: New histories of the Indian green revolution", *Geographical Journal* 185 (2019), 243–50.
- 49 G. Conway, *The Doubly Green Revolution: Food for All in the 21st Century* (Lontoo, 1997), 44–65.
- 50 Nobel-palkintokomitea, "Peace Prize 1970: Norman Borlaug", <https://www.nobelprize.org/prizes/peace/1970/borlaug/biographical/>.
- 51 Cullather, *Hungry World*, 239.
- 52 P. Pingali, "Green revolution: impacts, limits, and the path ahead", *PNAS* 109 (2012), 12,302–8.
- 53 G. Federico, *Feeding the World: An Economic History of Agriculture, 1800–2000* (Princeton, 2000), 69–82; Ross, *Ecology and Power*, 384.

- 54 Cullather, *Hungry World*, 236–7.
- 55 Ibid., 241–2; Ross, *Ecology and Power*, 386.
- 56 UNRISD, *The Social and Economic Implications of Large-Scale Introduction of New Varieties of Food Grain: Summary of Conclusion of a Global Research Project* (Geneva, 1974), 24.
- 57 Z. Poppel, "Quick rice: International development and the Green Revolution in Sierra Leone, 1960–1976", teoksessa C. Helstosky (toim.), *The Routledge History of Food* (Abingdon, 2015), 332–51.
- 58 N. Cullather, "Miracles of Modernization: The Green Revolution and the Apotheosis of Technology", *Diplomatic History* 28 (2004), 243–5.
- 59 V. Shiva, *The Violence of the Green Revolution: Third World Agriculture, Ecology and Politics* (Lontoo, 1991), 47; Ross, *Ecology and Power*, 386.
- 60 P. Srivastava, M. Balhara ja B. Giri, "Soil health in India: past history and future perspective", teoksessa B. Giri ja A. Varma (toim.), *Soil Health* (New Delhi, 2020), 1–19.
- 61 N. Sharma ja R. Singhvi, "Effects of chemical fertilizers and pesticides on human health and environment: a review", *International Journal of Agriculture, Environment and Biotechnology* 10 (2017), 675–80.
- 62 Ross, *Ecology and Power*, 386–9.
- 63 D. Nierenberg, "Agriculture: growing food and solutions", teoksessa E. Assadourian et al. (toim.), *State of the World 2013: Is Sustainability Still Possible?* (Washington, DC, 2013), 190–200.
- 64 K. Davis et al., "Alternative cereals can improve water use and nutrient supply in India", *Science Advances* 4 (2018), 1–11.
- 65 I. Singh, "Changes of agriculture production in India after Green Revolution", *Journal of the Gujarat Research Society* 21 (2019), 2290–4.
- 66 S. Prasad, "Innovating at the margins: the system of rice intensification in India and transformative social innovation", *Ecology & Society* 21 (2016), 1–9.
- 67 E. Brainerd ja N. Menon, "Seasonal effects of water quality: the hidden costs of the Green Revolution to infant and child health in India", *Journal of Development Economics* 107 (2014), 49–64.
Kokonaiskatsaukseksi ks. D. John ja G. Babu, "Lessons from the Aftermaths of Green Revolution on Food System and Health", *Frontiers in Sustainable Food Systems* 22 (2021), 1–6.
- 68 Ross, *Ecology and Power*, 393; M. Fearnside, "Transmigration in Indonesia: Lessons from its Environmental and Social Impacts", *Environmental Management* 21 (1997), 553–70.
- 69 Cullather, *Hungry World*, 242, 247–8.
- 70 Ehrlich, *Population Bomb*, p. xii.

- 71 A. Coale ja E. Hoover, *Population Growth and Economic Development in Low-Income Countries* (Princeton, 1958), 128–31.
- 72 Cullather, *Hungry World*, 245.
- 73 M. Connelly, *Fatal Misconception: The Struggle to Control World Population* (Cambridge, MA, 2008).
- 74 Shapiro, *Mao's War against Nature*, 29–32.
- 75 Ibid., 34.
- 76 Ibid., 35–6; J. Banister, *China's Changing Population* (Stanford, 1987), 148–50.
- 77 J. Zhang, "The Evolution of China's One-Child Policy and its Effects on Family Outcomes", *Journal of Economic Perspectives* 31 (2017), 141–59.
- 78 S. Greenhalgh, "Science, Modernity, and the Making of China's One-Child Policy", *Population and Development Review* 29 (2003), 163–96; S. Greenhalgh, *Just One Child: Science and Policy in Deng's China* (Berkeley, 2008).
- 79 R. Revelle ja H. Suess, "Carbon dioxide exchange between the atmosphere and ocean and the question of an increase of atmospheric CO₂ during the past decades", *Tellus* 9 (1957), 18–27.
- 80 R. Doel, "Constituting the Postwar Earth Sciences: The Military's Influence on the Environmental Sciences in the USA after 1945", *Social Studies of Science* 33 (2003), 636–8.
- 81 Edwards, "Entangled histories", 32; C. Keeling, "Atmospheric carbon dioxide variations at the Mauna Loa Observatory", *Tellus* 28 (1976), 538–51.
- 82 J. Gertner, *The Ice at the End of the World: An Epic Journey into Greenland's Buried Past and our Perilous Future* (Lontoo, 2019); E. Weiss, "Cold War under the ice: The Army's bid for a long-range nuclear role, 1959–1963", *Journal of Cold War Studies* 3 (2011), 31–58. Operaatio HIGHJUMPista ks. US Navy Antarctic Development Program, *Report of Operation Highjump 1947* (2020).
- 83 E. Fedorov, "Воздействие человека на метеорологические процессы", *Вопросы философии* 4 (1958), 137–44.
- 84 M. Budyko, Современные проблемы метеорологии приземного слоя воздуха (Leningrad, 1956); M. Budyko, "Метеорологические исследования в СССР", *Метеорология и Гидрология* II (1957), 7–16; M. Budyko, Тепловой баланс земной поверхности (Leningrad, 1958). Ks. J. Oldfield, "Mikhail Budyko's (1920–2001) contributions to Global Climate Science: from heat balances to climate change and global ecology", *WIREs Climate Change* 7 (2016), 682–92.

- 85 M. Budyko, "The effect of solar radiation variations on the climate of the Earth", *Tellus* 21 (1969), 611–19; ks. myös H. Kashiwase et al., "Evidence for ice-ocean albedo feedback in the Arctic Ocean shifting to a seasonal ice zone", *Scientific Reports* 7 (2017), 1–10.
- 86 M. Budyko, Изменения климата (Leningrad, 1969), 35–6. Ks. myös M. Budyko, Влияние человека на климат (Leningrad, 1972).
- 87 E. Robinson ja R. Robbins, "Sources, adundance, and fate of gaseous atmospheric pollutants. Final report and supplement", Stanford Research Institute (1968).
- 88 H. Landsberg, "Man-Made Climatic Changes", *Science* 170 (1970), 1265–74.
- 89 G. Kukla ja R. Matthews, "When will the present inter-glacial end?", *Science* 178 (1972), 190–1; N.-A. Mörner, "When will the present interglacial end?", *Quaternary Research* 2 (1972), 341–9.
- 90 P. Crutzen, "The Influence of Nitrogen Oxides on the Atmospheric Ozone Content", *Quarterly Journal of the Royal Meteorological Society* 96 (1970), 320–5; H. Johnston, "Reduction of Stratospheric Ozone by Nitrogen Oxide Catalysts from Supersonic Transport Exhaust", *Science* 173 (1971), 517–22; M. Molina ja F. Rowland, "Stratospheric Sink for Chlorofluoromethanes: Chlorine Atom-Catalyzed Destruction of Ozone", *Nature* 249 (1974), 810–12.
- 91 Ks. esim. B. Friedan, "The Coming Ice Age", *Harper's Magazine*, elokuu 1958; Fleming, *Historical Perspectives on Climate Change*, 131–2.
- 92 Perusteellinen lista 1970-luvun raportteja, ks. R. Cordato, "Climate experts believe the next ice age is on its way ... within a lifetime", John Locke Foundation, 6.3.2013, <https://www.johnlocke.org/climate-experts-believe-the-next-ice-age-is-on-its-way-within-a-lifetime/>.
- 93 *Time*, "Another Ice Age?", 24.6.1974.
- 94 *Newsweek*, "The Cooling World", 28.4.1975.
- 95 National Science Board, *Science and the Challenges Ahead* (Washington, DC, 1974), 25–6.
- 96 National Academy of Sciences, *Understanding Climatic Change: A Program for Action* (Washington, DC, 1975), 1.
- 97 Kissinger, "Address to the Sixth Special Session of the United Nations General Assembly", 580–1.
- 98 R. Reeves ja D. Gemmill (toim.), *Climate Prediction Center: Reflections on 25 Years of Analysis, Diagnosis and Prediction* (Washington, DC, 2004), 2–3.
- 99 CIA, *A Study of Climatological Research as it Pertains to Intelligence Problems* (Washington, DC, 1974), 1.

- 100 Ibid., 2–3.
- 101 Ibid., 7.
- 102 CIA, *Potential Implications of Trends in World Population, Food Production, and Climate*, 2, 30–1.
- 103 Ibid., 4, 31–4.
- 104 Ibid., 36–7.
- 105 Ibid., 41–2.
- 106 G. Will, "A Change in the Weather", *Washington Post*, 24.1.1975.
- 107 Cullather, *Hungry World*, 256.
- 108 "The Energy Emergency", *Presidential Documents. Richard Nixon, 1973* (Washington, DC, 1973), 1312.
- 109 Ibid., 1313.
- 110 Ibid., 1313–14.
- 111 Ibid., 1317.
- 112 C. Clotfelter ja J. Hahn, "Assessing the National 55mph Speed Limit", *Policy Sciences* 9 (1978), 281–94.
- 113 Presidentti Jimmy Carter, "Address to the Nation on the National Energy Plan", 8.11.1977, *Public Papers of the Presidents of the United States: Jimmy Carter*, 9 vols (Washington, DC, 1977–82), 1, 1981–2.
- 114 Ibid., 1982–7.
- 115 Nixon, "Special Message to the Congress on Energy Resources", 4.6.1971, *Public Papers of the Presidents of the United States: Richard Nixon, 1971* (Washington, DC, 1971), 703–14; Nixon, "Special Message to the Congress on Energy Policy", 18.4.1973, *Public Papers of the Presidents of the United States: Richard Nixon, 1973* (Washington, DC, 1975), 302–9.
- 116 Carter, "The Energy Problem", 18.4.1977, *Public Papers of the Presidents of the United States: Jimmy Carter*, 1, 656–62.
- 117 Carter, "Energy and National Goals", 13.7. April 1979, *Public Papers of the Presidents of the United States: Jimmy Carter*, 5, 1235–41.
- 118 Ronald Reagan, "Fourth Annual Conservative Political Action Conference", in *The Last Best Hope: The Greatest Speeches of Ronald Reagan* (West Palm Beach, 2016), 50.
- 119 Carter, "Solar Energy, 20.6.1979", *Public Papers of the Presidents of the United States: Jimmy Carter*, 5, 1095–6.
- 120 R. Apple, "25 Years Later: Lessons from the Pentagon Papers", *New York Times*, 23.6.1996; *The Pentagon Papers: The Secret History of the Vietnam War* (New York, 2017).
- 121 *New York Times Co. vs United States*, 403 US 713 (1971); A. Aviki et al., "The Pentagon Papers Framework, Fifty Years Later", teoksessa L.

- Bollinger ja G. Stone (toim.), *National Security, Leaks & Freedom of the Press: The Pentagon Papers Fifty Years On* (Oxford, New York, 2021), 1–2.
- 122 J. Anderson, "Air Force Has its Rainmakers", *Washington Post*, 18.3.1971.
- 123 Yhdysvaltain senaatti, *Hearings before the Subcommittee on Oceans and International Environment: Weather Modification*, 29.1.1974, referring to testimony delivered on 18.4.1972, 109–10.
- 124 S. Hersh, "Rainmaking is Used as Weapon by US", *New York Times*, 3.7.1972.
- 125 Yhdysvaltain senaatti, "Weather Modification", 112.
- 126 "Memorandum from the Deputy Under Secretary of State for Political Affairs (Kohler) to Secretary of State Rusk", 13.1.1967, *Foreign Relations of the United States, 1964–1968*, vol. 28: *Laos* (Washington, DC, 1998), Document 274.
- 127 Ibid.
- 128 Yhdysvaltain senaatti, "Weather Modification", 89.
- 129 Ibid., 93, 102.
- 130 Ibid., 93, 115–16.
- 131 Ibid., 36, 77.
- 132 R. Doel ja K. Harper, "Prometheus Unleashed: Science as a Diplomatic Weapon in the Lyndon B. Johnson Administration", *Osiris* 21 (2006), 66–85.
- 133 Yhdysvaltain senaatti, "Weather Modification", 47.
- 134 Ibid., 1–2.
- 135 93rd Congress, S. Res. 71, "Resolution", 11.7.1973, 3–8.
- 136 L. Freedman, "SALT 50 Years On: Strategic Theory and Arms Control", *Global Politics and Strategy* 62 (2022).
- 137 Y. Richmond, *Cultural Exchange and the Cold War: Raising the Iron Curtain* (University Park, PA, 2003);
J. Voorhees, *Dialogue Sustained: The Multilevel Peace Process and the Dartmouth Conference* (Washington, DC, 2002).
- 138 I. Detter, *The Law of War* (Cambridge, 2003), 295–8.
- 139 Yhdystyneet kansakunnat, "Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques", 10.12.1976.
- 140 L. Battan, "Weather Modification in the Soviet Union – 1976", *Bulletin of the American Meteorological Society* 58 (1977), 4–19.
- 141 United States Arms Control, *Worldwide Effects of Nuclear War: Some Perspectives* (Washington, DC, 1975).

- 142 P. Crutzen ja J. Birks, "The atmosphere after a nuclear war: Twilight at noon", *Ambio* 11 (1982), 114–25.
- 143 M. Hamblin, *Arming Mother Nature: The Birth of Catastrophic Environmentalism* (Oxford, 2013), 137.
- 144 R. Turco et al., "Nuclear Winter: Global Consequences of Multiple Nuclear Explosions", *Science* 222 (1983), 1283–92.
- 145 V. Aleksandrov ja G. Stenchikov, "О моделировании климатических последствий ядерной войны", Журнал вычислительной математики и математической физики 24 (1984), 87–90.
- 146 Director of Central Intelligence, Interagency Intelligence Assessment, "The Soviet Approach to Nuclear Winter", 10.12.1984 (1984), 1–2.
- 147 Ibid., 11–17.
- 148 Ibid., 6.
- 149 Hamblin, *Arming Mother Nature*, 237–41.
- 150 "Science and the Citizen", *Scientific American* 240 (1984), 74.
- 151 S. Kapitsa, "A Soviet view of nuclear winter", *Bulletin of the Atomic Scientists* 41 (1985), 37–8.
- 152 Ks. esim. P. Podvig, "Did Star Wars Help End the Cold War? Soviet Response to the SDI Program", *Science & Global Security* 25 (2017), 3–27.
- 153 D. Kuzmiak, "The American Environmental Movement", *Geographic Journal* 157 (1991), 265–78.
- 154 I. Gerasimov, Ресурсы биосфера на территории СССР: научные основы их рационального использования и охраны (Moskova, 1971); P. Oldak, "Равновесное природополь зование и экономический рост", Экономика и организация промышленного производства 8 (1984), 44–61.
- 155 K. Gestwa, "Ökologischer Notstand und sozialer Protest. Ein umwelthistorischer Blick auf die Reformunfähigkeit und den Zerfall der Sowjetunion", *Archiv für Sozialgeschichte* 43 (2003), 325–48; L. Coumel ja M. Elie, "A Belated and Tragic Ecological Revolution: Nature, Disasters, and Green Activists in the Soviet Union and the Post-Soviet States, 1960s–2010s", *Soviet and Post-Soviet Review* 40 (2013), 157–65.
- 156 Guha, *Unquiet Woods*, 152–84.
- 157 H. Gibbs et al., "Tropical forests were the primary sources of new agricultural land in the 1980s and 1990s", *PNAS* 107 (2010), 16,732–7; S. Schwartzman et al., "Social Movements and Large-Scale Tropical Forest Protection on the Amazon Frontier: Conservation from Chaos", *Journal of Environment & Development* 19 (2010), 274–99.

- 158 T. Doyle ja S. MacGregor (toim.), *Environmental Movements around the World: Shades of Green in Politics and Culture*, 2 vols (Santa Barbara, CA, 2014).
- 159 "Joint Statement: President Ronald Reagan and General Secretary Mikhail Gorbachev, 21 November, 1985", *Department of State Bulletin* 86 (1986), 10.
- 160 Ks. esim. Molina ja Rowland, "Stratospheric Sink for Chlorofluoromethanes", 810–12; S. Roan, *Ozone Crisis: The 15-Year Evolution of a Sudden Global Emergency* (New York, 1989).
- 161 J. Farman, B. Gardiner ja J. Shanklin, "Large losses of total ozone in Antarctica reveal seasonal ClO_x/NO_x interaction", *Nature* 315 (1985), 207–10.
- 162 K. Annan, *We the Peoples: The Role of the United Nations in the 21st Century* (New York, 2005), 56; A. Douglass, P. Newman ja S. Solomon, "The Antarctic ozone hole: an update", *Physics Today* 67 (2014), 42–8.
- 163 Yhdysvaltain edustajainhuone, ulkoasiainkomitea, "The Reagan–Gorbachev Summit and its Implications for United States–Soviet Relations" (Washington, DC, 1987), 79.
- 164 Yhdistyneet kansakunnat, "Resolution adopted by the General Assembly 43/196. UN Conference on Environment and Development", 20.12.1988; "Resolution adopted by the General Assembly 44/228. UN Conference on Environment and Development", 22.12.1989.
- 165 Yhdysvaltain senaatti, "Testimony before US Senate Committee on Energy and Natural Resources: Greenhouse Effect and Climate Change", 100th Congress, 1st session, 23.6.1988; C. Moser ja L. Dilling (toim.), *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change* (Cambridge, 2007), 1.
- 166 S. Agrawala ja S. Andresen, "Indispensability and Indefensibility? The United States in the Climate Treaty Negotiations", *Global Governance* 5 (1999), 459.
- 167 Yhdistyneet kansakunnat, "United Nations Framework Convention on Climate Change" (1992).
- 168 Presidentti George H. W. Bush, "Address to the United Nations Conference on Environment and Development in Rio de Janeiro", 12.6.1992, *Public Papers of the Presidents of the United States. George Bush, 1992–93*, 2 vols (Washington, DC, 1993), 1, 925.
- 169 World Meteorological Organisation, *Proceedings: World Conference, Toronto 1988* (Geneva, 1989); Yhdistyneet kansakunnat, "United Nations Framework Convention on Climate Change" (New York, 1992).

- 170 Kyoto Protocol to the United Nations Framework Convention on Climate Change, 9.5.1992.
- 171 Yhdysvaltain kongressi, "A resolution expressing the sense of the Senate regarding the conditions for the United States becoming a signatory to any international agreement on greenhouse gas emissions under the United Nations Framework Convention on Climate Change", 12.6.1997.
- 172 "Bush was aloof in warming debate", *Washington Post*, 31.10.1992.
- 173 Clinton Presidential Records: Mandatory Declassification Review, "Telcon with Prime Minister Blair of the United Kingdom", 27.5.2000.
- 174 R. Goyal et al., "Reduction in surface climate change achieved by the 1987 Montreal Protocol", *Environmental Research Letters* 14 (2019), 1–10.
- 175 BBC News, "Putin deplores collapse of USSR", 25.4.2005.

EKOLOGISTEN RAJOJEN REUNALLA

- 1 Ross, *Ecology and Power*, 398–9.
- 2 B. Söderlund, "The Importance of Business Travel for Trade: Evidence from the Liberalisation of Soviet Airspace", Research Institute of Industrial Economics, Working Paper Series 1355 (2020), 1–51.
- 3 F. Schierhorn et al., "Large greenhouse gas savings due to changes in the post-Soviet food systems", *Environmental Research Letters* 14 (2019), 1–12.
- 4 H. Schaefer, "On the Causes and Consequences of Recent Trends in Atmospheric Methane", *Current Climate Change Reports* 5 (2019), 259–74.
- 5 D. Cutler ja L. Summers, "The COVID-19 pandemic and the \$16 trillion virus", *Journal of the American Medical Association* 324 (2020), 1495–6.
- 6 F. Dikötter, *China after Mao: The Rise of a Superpower* (Lontoo, 2022), p. vii.
- 7 E. Thaler et al., "Rates of Historical Anthropogenic Soil Erosion in the Midwestern United States", *Earth's Future* 10 (2022), 1–16.
- 8 P. Borelli et al., "An assessment of the global impact of 21st century land use change on soil erosion", *Nature Communications* 8 (2017), 1–13.
- 9 T. Münzel et al., "Soil and water pollution and human health: what should cardiologists worry about?", *Cardiovascular Research* (2022), 1–10.
- 10 Sanderson ja Frey, "From desert to breadbasket", 516–32.
- 11 K. Gibbs et al., "Tropical forests were the primary sources of new agricultural land in the 1980s and 1990s", *PNAS* 107 (2010), 16,732–7.

- 12 F. Pendrill et al., "Disentangling the numbers behind agriculture-driven tropical deforestation", *Science* 377 (2022), 1–12.
- 13 WWF, "Palm Oil: Overview", <https://www.worldwildlife.org/industries/palm-oil>.
- 14 E. Fitzherbert, "How will oil palm expansion affect biodiversity?", *Trends in Ecology & Evolution* 23 (2008), 538–45; Commission of the European Communities, *An EU Strategy for Biofuels* (Brussels, 2006).
- 15 E. Tyukavina et al., "Types and rates of forest disturbance in Brazilian Legal Amazon, 2000–2013", *Science Advances* 3 (2017), 1–15; P. Vale et al., "The Expansion of Intensive Beef Farming to the Brazilian Amazon", *Global Environmental Change* 57 (2019), 1–11.
- 16 W. Carvalho et al., "Deforestation control in the Brazilian Amazon: a conservation struggle being lost as agreements and regulations are subverted and bypassed", *Perspectives in Ecology and Conservation* 17 (2019), 122–30; D. Roy, "Deforestation of Brazil's Amazon Has Reached a Record High. What's Being Done?", Council for Foreign Relations, 17.3.2022.
- 17 A. Tyukavina et al., "Congo Basin forest loss dominated by increasing smallholder clearing", *Science Advances* 4 (2018), 1–12.
- 18 E. zu Ermgassen et al., "Using supply chain data to monitor zero deforestation commitments: an assessment of progress in the Brazilian soy sector", *Environmental Research Letters* 15 (2020), 1–12; P. Oliveira, "Trends in water balance components across the Brazilian Cerrado", *Water Resources Research* 50 (2014), 7100–14; N. Myers et al., "Biodiversity hotspots for conservation priorities", *Nature* 403 (2000), 853–8.
- 19 R. Estoque et al., "Spatiotemporal pattern of global forest change over the past 60 years and the forest transition theory", *Environmental Research Letters* 17 (2022), 6.
- 20 YK:n elintarvike- ja maatalousjärjestön (FAO), *The Future of Food and Agriculture – Trends and Challenges* (Rooma, 2017); T. Garnett et al., *Grazed and Confused?*, Food Climate Research Network (Oxford, 2017).
- 21 P. Newton et al., "The number and spatial distribution of forest-proximate people globally", *One Earth* 3 (2020), 363–70.
- 22 UNEP, *The State of the World's Forests: Forests, Biodiversity and People* (Rooma, 2020), p. vi.
- 23 K. Carlson ja L. Curran, "Refined carbon accounting for oil palm agriculture: Disentangling potential contributions of indirect emissions and smallholder farmers", *Carbon Management* 4 (2013), 347–9.

- 24 Y. Fung et al., "Upward expansion and acceleration of forest clearance in the mountains of Southeast Asia", *Nature Sustainability* 4 (2021), 892–9.
- 25 C. Boulton, T. Lenton ja N. Boers, "Pronounced loss of Amazon rainforest resilience since the early 2000s", *Nature Climate Change* 12 (2022), 271–8.
- 26 V. Gatti et al., "Amazonia as a carbon source linked to deforestation and climate change", *Nature* 595 (2021), 388–93.
- 27 K. Covey et al., "Carbon and Beyond: The Biogeochemistry of Climate in a Rapidly Changing Amazon", *Frontiers in Forests and Global Change* 11 (2021), 1–20.
- 28 N. Boers et al., "A deforestation-induced tipping point for the South American monsoon system", *Scientific Reports* 7 (2017), 1–9; T. Lovejoy ja C. Nobre, "Amazon tipping point", *Science Advances* 4 (2018), 1.
- 29 M. Weisse ja E. Goldman, "Forest Pulse: The Latest on the World's Forests", *Global Forest Review*, 28.4.2022.
- 30 Yhdistyneet kansakunnat, *Spreading Like Wildfire: The Rising Threat of Extraordinary Landscape Fires* (Nairobi, 2022); S. Hugelius et al., "Large stocks of peatland carbon and nitrogen are vulnerable to permafrost thaw", *PNAS* 17 (2020), 20,438–46; A. Goldstein et al., "Protecting irrecoverable carbon in Earth's ecosystems", *Nature Climate Change* 10 (2020), 287–95.
- 31 Yhdistyneet kansakunnat, Climate Change Conference, <https://ukcop26.org/glasgow-leaders-declaration-on-forests-and-land-use/>.
- 32 C. Bellard, P. Casey ja T. Blackburn, "Alien species as a driver of recent extinctions", *Biology Letters* 12 (2016), 1–4; H. Seebens et al., "Projecting the continental accumulation of alien species through to 2050", *Global Change Biology* 27 (2021), 970–82.
- 33 T. Fritts, "Economic costs of electrical system instability and power outages caused by snakes on the Island of Guam", *International Biodeterioration & Biodegradation* 49 (2002), 93–100.
- 34 B. Kaiser ja K. Burnett, "Economic impacts of E. Coqui frogs in Hawaii", *Interdisciplinary Environmental Review* 8 (2006), 1–11. Ks. yleisesti, I. Soto et al., "Global economic costs of herpetofauna invasions", *Scientific Reports* 12 (2022), 1–12.
- 35 K. Willis (toim.), *State of the World's Plants 2017* (Lontoo, 2017), 71.
- 36 A. Antonelli et al., *State of the World's Plants and Fungi 2020* (Lontoo, 2020), 51.
- 37 N. Straw et al., "History and development of an isolated outbreak of Asian longhorn beetle *Anoplophora glabripennis* (Coleoptera: Cerambycidae) in southern England", *Agricultural and*

- Forest Entomology* 18 (2016), 280–93; Yhdistyneen kuningaskunnan hallitus, "Asian Longhorn Beetle eradicated in the UK", lehdistötiedote, 17.5.2019.
- 38 Willis (toim.), *State of the World's Plants*, 71.
- 39 D. Paini et al., "Global threat to agriculture from invasive species", *PNAS* 113 (2016), 7575–9; D. Renault et al., "The magnitude, diversity, and distribution of the economic costs of invasive terrestrial invertebrates worldwide", *Science of the Total Environment* 835 (2022), 1–11.
- 40 G. Buczkowski ja C. Bertelsmeier, "Invasive termites in a changing climate: A global perspective", *Ecology and Evolution* 7 (2017), 974–85.
- 41 C. Buttner et al., "Bacteriophages and Bacterial Plant Diseases", *Frontiers in Microbiology* 8 (2017), 1–15.
- 42 D. Davis, M. Epp ja H. Riordan, "Changes in USDA Food Composition Data for 43 Garden Crops, 1950 to 1999", *Journal of the American College of Nutrition* 23 (1999), 669–82; D. Wallace-Wells, *The Uninhabitable Earth: A Story of the Future* (Lontoo, 2019), 57.
- 43 R. Forslid, "Trade, Transportation and the Environment", Centre for Economic Policy Research, Discussion Papers 14228 (2019), 1.
- 44 A. Schneider, M. Friedl ja D. Potere, "A new map of global urban extent from MODIS satellite data", *Environmental Research Letters* 4 (2009), 1–11.
- 45 Yhdistyneet kansakunnat, *World Urbanization Prospects: The 2018 Revision* (New York, 2019), xix, 1.
- 46 OECD, *Urbanisation and Green Growth in China*, OECD Regional Development Working Papers 2013/07 (Pariisi, 2013), 30–1.
- 47 Y. Guo ja W. Qiao, "Rural Migration and Urbanisation in China: Historical Evolution and Coupling Pattern", *Sustainability* 12 (2020), 1; K. Farrell ja H. Westlund, "China's rapid urban ascent: an examination into the components of urban growth", *Asian Geographer* 35 (2018), 85–106.
- 48 V. Smil, *Making the Modern World: Materials and Dematerialization* (Lontoo, 2018), 285.
- 49 Oxford Economics, *Global Cities: The Future of the World's Leading Urban Economies to 2035* (Oxford, 2018).
- 50 Yhdistyneet kansakunnat, *World Urbanization Prospects*, 77, xix.
- 51 Yhdistyneet kansakunnat, *World Cities Report 2020: The Value of Sustainable Urbanization* (Nairobi, 2020), p. xvii.
- 52 Ibid., 3; Yhdistyneet kansakunnat, *The Sustainable Development Goals Report 2022* (New York, 2022), 47.

- 53 L. Zhao et al., "Global multi-model projections of local urban climates", *Nature Climate Change* 11 (2021), 152–7.
- 54 O. Daramola ja P. Olawuni, "Assessing the water supply and sanitation sector for post-2015 development agenda: a focus on Lagos Metropolis, Nigeria", *Environment, Development and Sustainability* 21 (2019), 1127–38.
- 55 City of New York, *Annual Comprehensive Financial Report of the Comptroller for the Fiscal Years Ended June 30, 2021 and 2020* (New York, 2022), 355.
- 56 M. Saunois et al., "The global methane budget 2000–2017", *Earth System Science Data* 12 (2020), 1561–623.
- 57 J. Maasakkers et al., "Using satellites to uncover large methane emissions from landfills", *Science Advances* 8 (2022), 1–8.
- 58 T. Wei, J. Wu ja S. Chen, "Keeping Track of Greenhouse Gas Emission Reduction Progress and Targets in 167 Cities Worldwide", *Frontiers in Sustainable Cities* 3 (2021), 1–13.
- 59 M. Greenstone, C. Hasenkopf ja K. Lee, *Air Quality Life Index: Annual Update 2022* (Chicago, 2022), 10, 12, 6–7.
- 60 Wei, Wu ja Chen, "Keeping Track of Greenhouse Gas", 1–13.
- 61 J. Scott, "Think Tank: Studying How the Defeat of Heat Changed Nearly Everything", *New York Times*, 29.8.1998.
- 62 O. Deschênes ja M. Greenstone, "Climate Change, Mortality, and Adaptation: Evidence from Annual Fluctuations in Weather in the US", NBER Working Papers 13178 (2007), 1–42.
- 63 G. Heal ja J. Park, "Feeling the Heat: Temperature, Physiology and the Wealth of Nations", Harvard Environmental Economics Discussion Paper 14-51 (2014), 3.
- 64 Wallace-Wells, *Uninhabitable Earth*, 46–7; Heal ja Park, "Feeling the Heat", 19.
- 65 Wallace-Wells, *Uninhabitable Earth*, 42; A. Demirbas et al., "The Cost Analysis of Electric Power Generation in Saudi Arabia", *Energy Sources* 12 (2017), 591–6.
- 66 Wallace-Wells, *Uninhabitable Earth*, 42.
- 67 D. Newman, "New Residents Flood into the Most Drought-Stricken Counties", Economic Innovation Group, 27.7.2021.
- 68 M. Hino ja M. Burke, "The effect of information about climate risk on property values", *PNAS* 118 (2021), 1–9.
- 69 N. Jones, "Waste Heat: Innovators Turn to an Overlooked Renewable Resource", *Yale Environment 360*, 29.5.2018.
- 70 WRAP, *Food Surplus and Waste in the UK – Key Facts* (2021), 1.

- 71 UNEP, *Food Waste Index Report 2021* (Nairobi, 2021); Reuters, "U.N. report says 17% of food wasted at consumer level", 4.3.2021.
- 72 C. Mbow et al., "Food security", IPCC, *Special Report: Climate Change and Land* (2019), 475–80.
- 73 Yhdistyneet kansakunnat, Climate Change, "UN Helps Fashion Industry Shift to Low Carbon", 6.9.2018.
- 74 UNEP, "Putting the Brakes on Fast Fashion", 12.11.2018.
- 75 J. Leonard, "30 Shocking Figures and Facts in Global Textile and Apparel Industry", Business 2 Community, 7.5.2015.
- 76 UNEP, "Putting the Brakes on Fast Fashion".
- 77 Agence France Presse, "Chile's desert dumping ground for fast fashion leftovers", 12.11.2021.
- 78 L. van Woensel ja S. Lipp, "What if fashion were good for the planet?", European Parliamentary Research Service, Scientific Foresight Unit (2020); Yhdistyneet kansakunnat, "UN launches drive to highlight environmental cost of staying fashionable", 25.3.2019.
- 79 Euroopan komissio, "Water Scarcity and Drought", elokuu 2010, 2.
- 80 UNEP, *Options for Decoupling Economic Growth from Water Use and Water Pollution: Report of the International Resource Panel Working Group on Sustainable Water Management* (2015), 2, 17.
- 81 Discover Water, "Leaking Pipes", <https://discoverwater.co.uk/leaking-pipes>; European Commission, "Water Scarcity and Drought", 2.
- 82 C. Villanueva et al., "Health and environmental impacts of drinking water choices in Barcelona, Spain: A modelling study", *Science of the Total Environment* 795 (2021), 1–10.
- 83 S. Laville ja M. Taylor, "A million bottles a minute: world's plastic binge 'as dangerous as climate change'", *Guardian*, 28.6.2017; Euromonitor International, *Global Trends in Food and Drinks Packaging* (2017).
- 84 C. Jones, "Davos: Coke insists customers still want plastic bottles", *The Times*, 22.1.2020.
- 85 Transport & Environment, *One Corporation to Pollute Them All: Luxury Cruise Air Emissions in Europe* (Brussels, 2019); M. Sofiev et al., "Cleaner fuels for ships provide public health benefits with climate tradeoffs", *Nature Communications* 9 (2018), 1–12.
- 86 R. Ryan et al., "Impact of Rocket Launch and Space Debris Air Pollutant Emissions on Stratospheric Ozone and Global Climate", *Earth's Future* 10 (2022), 1–13.
- 87 WARC, "Alibaba attempts to green Singles Day", 12.11.2019.

- 88 X. Yue ja H. Minghe, "Singles' Day: Record-breaking sales focus new attention on packaging waste as almost 4 billion parcels are shipped", *South China Morning Post*, 18.11.2019.
- 89 Greenpeace China, "环保团体:电商、快递行业包装绿色化进程亟待推进", 11.11.2019.
- 90 W. Wang, "Protein aggregation and its inhibition in biopharmaceutics", *International Journal of Pharmaceutics* 289 (2005), 1–30.
- 91 R. Mihigo et al., "Improving access to affordable vaccines for middle-income countries in the African Region", *Vaccine* 37 (2019), 2838–42; A. Ashok, M. Brinson ja Y. LeTallec, "Improving cold chain systems: Challenges and solutions", *Vaccine* 35 (2017), 2217–23.
- 92 N. Crawford, "The Pentagon Fuel Use, Climate Change and the Costs of War", Watson Institute, Brown University (2019), 13, 4, 6.
- 93 Maailman ilmatieteen järjestö WMO, *The Changing Atmosphere: Implications for Global Security* (Geneva, 1989), 292.
- 94 Albert, *Subtitles to Save the World: Understanding How the Broadcasting Community is Covering Climate* (2019).
- 95 Albert, *Subtitles to Save the World: An Analysis of How UK Broadcasters are Exposing Audiences to Climate Change through their Content* (2021).
- 96 Met Office, "2020 ends earth's warmest 10 years on record", 14.1.2021.
- 97 O. Rakovec et al., "The 2018–2020 Multi-Year Drought Sets a New Benchmark in Europe", *Earth's Future* 10 (2022), 1–11.
- 98 A. Park Williams, B. Cook and J. Smerdon, "Rapid intensification of the emerging southwestern North American megadrought in 2020–2021", *Nature Climate Change* 12 (2022), 232–4.
- 99 I. Velicogna et al., "Continuity of Ice Sheet Mass Loss in Greenland and Antarctica from the GRACE and GRACE Follow-On Missions", *Geophysical Research Letters* 47 (2020), 1–8.
- 100 R. Stuart-Smith et al., "Increased outburst flood hazard from Lake Palcacocha due to human-induced glacier retreat", *Nature Geoscience* 14 (2021), 85–90.
- 101 F. Otto et al., "Climate change increased rainfall associated with tropical cyclones hitting highly vulnerable communities in Madagascar, Mozambique & Malawi", World Weather Attribution, 11.4.2022.
- 102 R. Neukom et al., "No evidence for globally coherent warm and cold periods", *Nature* 571 (2019), 550–4.
- 103 T. Ahmad ja D. Zhang, "A critical review of comparative global historical energy consumption and future demand: The story told far", *Energy Reports* 6 (2020), 1973–91.
- 104 Wallace-Wells, *Uninhabitable Earth*, 4.

- 105 M. Wei et al., "Revisiting the Existence of the Global Warming Slowdown during the Early Twenty-First Century", *Journal of Climate* 35 (2022), 1853–71.
- 106 M. Lynas, B. Houlton ja S. Perry, "Greater than 99% consensus on human caused climate change in the peer-reviewed scientific literature", *Environmental Research Letters* 16 (2021), 1–8.
- 107 S. Raghuraman, D. Paynter ja V. Ramaswamy, "Anthropogenic forcing and response yield observed positive trend in Earth's energy imbalance", *Nature Communications* 12 (2021), 1–10.
- 108 S. Braddock et al., "Relative sea-level data preclude major late Holocene ice-mass change in Pine Island Bay", *Nature Geoscience* 15 (2022), 568–72.
- 109 C. Bradshaw et al., "Hydrological impact of Middle Miocene Antarctic ice-free areas coupled to deep ocean temperatures", *Nature Geoscience* 14 (2021), 429–36.
- 110 L. Pan, "Rapid postglacial rebound amplifies global sea level rise following West Antarctic Ice Sheet collapse", *Science Advances* 7 (2021), 1–9.
- 111 R. Dziadek, F. Ferraccioli ja K. Gohl, "High geothermal heat flow beneath Thwaites Glacier in West Antarctica inferred from aeromagnetic data", *Communications Earth & Environment* 2 (2021), 1–6; S. González-Herrero et al., "Climate warming amplified the 2020 record-breaking heatwave in the Antarctic Peninsula", *Communications Earth & Environment* 3 (2022), 1–9.
- 112 S. Deng et al., "Polar Drift in the 1990s Explained by Terrestrial Water Storage Changes", *Geophysical Research Letters* 48 (2021), 1–10.
- 113 Y. Chen et al., "Thermokarst acceleration in Arctic tundra driven by climate change and fire disturbance", *One Earth* 4 (2021), 1718–29.
- 114 NASA, Moderate Resolution Imaging Spectroradiometer, "Smoke from Siberian Wildfires", 7.8.2021.
- 115 E. Berenguer et al., "Tracking the impacts of El Niño drought and fire in human-modified Amazonian forests", *PNAS* 118 (2021), 1–8.
- 116 T. Schneider, C. Kaul ja K. Pressel, "Possible climate transitions from breakup of stratocumulus decks under greenhouse warming", *Nature Geoscience* 12 (2019), 163–7.
- 117 N. Wunderling, "Interacting tipping elements increase risk of climate domino effects under global warming", *Earth System Dynamics* 12 (2021), 601–19.
- 118 D. Armstrong Mackay et al., "Exceeding 1.5 °C global warming could trigger multiple climate tipping points", *Science* 377 (2020), 1–11.

- 119 T. Slater, "Increased variability in Greenland Ice Sheet runoff from satellite observations", *Nature Communications* 12 (2021), 1–9.
- 120 J. Box, "Greenland ice sheet climate disequilibrium and committed sea-level rise", *Nature Climate Change* (2022), 1–11.
- 121 D. Smale et al., "Marine heatwaves threaten global biodiversity and the provision of ecosystem services", *Nature Climate Change* 9 (2019), 306–12; N. Gruber et al., "Biogeochemical extremes and compound events in the ocean", *Nature* 600 (2021), 395–407.
- 122 C. Free et al., "Impacts of historical warming on marine fisheries production", *Science* 363 (2019), 979–83.
- 123 R. Myers ja B. Worm, "Rapid worldwide depletion of predatory fish communities", *Nature* 423 (2003), 280–3; J. Jackson et al., "Historical overfishing and the recent collapse of coastal ecosystems", *Science* 293 (2001), 629–38; S. Ohayon, I. Granot ja J. Belmaker, "A meta-analysis reveals edge effects within marine protected areas", *Nature Ecology & Evolution* 5 (2021), 1301–8.
- 124 G. Ashton, "Predator control of marine communities increases with temperature across 115 degrees of latitude", *Science* 376 (2022), 1215–19; E. Tekwa, J. Watson ja M. Pinsky, "Body size and food-web interactions mediate species range shifts under warming", *Proceedings of the Royal Society B: Biological Sciences* 289 (2022).
- 125 S. Jane et al., "Widespread deoxygenation of temperate lakes", *Nature* 594 (2021), 66–70.
- 126 A. Oschiles, "A committed fourfold increase in ocean oxygen loss", *Nature Communications* 12 (2021), 1–8.
- 127 K. Tanaka ja K. Van Houtan, "The recent normalization of historical marine heat extremes", *Plos Climate* 1 (2022), 1–13.
- 128 W. Wang et al., "Emergent constraint on crop yield response to warmer temperature from field experiments", *Nature Sustainability* 3 (2020), 908–16; J. Desai et al., "Warm nights disrupt transcriptome rhythms in field-grown rice panicles", *PNAS* 118 (2021), 1–12.
- 129 M. Burke ja K. Emerick, "Adaptation to Climate Change: Evidence from US Agriculture", *American Economic Journal: Economic Policy* 8 (2016), 106–40.
- 130 K. Coyne et al., "Interactive effects of light, CO₂ and temperature on growth and resource partitioning by the mixotrophic dinoflagellate, *Karlodinium veneficum*", *PLOS ONE* 16 (2021), 1–20.
- 131 W. Tang et al., "Widespread phytoplankton blooms triggered by 2019–2020 Australian wildfires", *Nature* 597 (2021), 370–5.

- 132 O. Koppel ja J. Kerr, "Strong phenological shifts among bumblebee species in North America can help predict extinction risk", *Biological Conservation* 272 (2022), 1–7.
- 133 J. González-Varo et al., "Limited potential for bird migration to disperse plants to cooler latitudes", *Nature* 595 (2021), 75–9.
- 134 B. Oliveira et al., "Community-wide seasonal shifts in thermal tolerances of mosquitoes", *Ecology* 102 (2021), 1–12.
- 135 F. Colón-González et al., "Projecting the risk of mosquito-borne diseases in a warmer and more populated world: a multi-model, multi-scenario intercomparison modelling study", *Lancet Planetary Health* 5 (2021), 1–11.
- 136 UNEP, *Preventing the Next Pandemic: Zoonotic Diseases and How to Break the Chain of Transmission* (Nairobi, 2020), 11–12.
- 137 C. Mora et al., "Over half of known human pathogenic diseases can be aggravated by climate change", *Nature Climate Change* (2022), 1–9.
- 138 T. Slater et al., "Increased variability in Greenland Ice Sheet runoff from satellite observations", *Nature Communications* 12 (2021) 1–9; A. Grinset ja J. Hesselbjerg Christiansen, "The transient sensitivity of sea level rise", *Ocean Science* 17 (2021), 181–6; C. Chambers et al., "Mass loss of the Antarctic ice sheet until the year 3000 under a sustained late-21st-century climate", *Journal of Glaciology* 68 (2022), 605–17.
- 139 N. Bloemendaal et al., "A globally consistent local-scale assessment of future tropical cyclone risk", *Science Advances* 8 (2022), 1–13.
- 140 B. Poujol et al., "Kilometer-scale modeling projects a tripling of Alaskan convective storms in future climate", *Climate Dynamics* 55 (2020), 3543–64; B. Poujol et al., "Dynamic and thermodynamic impacts of climate change on organized convection in Alaska", *Climate Dynamics* 56 (2021), 2569–93.
- 141 A. Kahraman et al., "Quasi-Stationary Intense Rainstorms Spread across Europe under Climate Change", *Geophysical Research Letters* 48 (2021), 1–11.
- 142 First Street Foundation, *The 6th National Risk Assessment: Hazardous Heat* (2022), 4, 8–9.
- 143 J. Wang et al., "Changing Lengths of the Four Seasons by Global Warming", *Geophysical Research Letters* 48 (2021), 1–9; N. Lorenzo, A. Díaz-Poso ja D. Royé, "Heatwave intensity on the Iberian Peninsula: Future climate projections", *Atmospheric Research* 258 (2021), 1–10.

- 144 C. Rogers et al., "Sixfold Increase in Historical Northern Hemisphere Concurrent Large Heatwaves Driven by Warming and Changing Atmospheric Circulations", *Journal of Climate* 35 (2022), 1063–78.
- 145 I. Wilkinson ja T. Kington, "Mediterranean faces months of 50°C heatwaves", *The Times*, 28.5.2021.
- 146 M. Burke et al., "Higher temperatures increase suicide rates in the United States and Mexico", *Nature Climate Change* 8 (2018); L. Taylor et al., "Environmental Conditions on Cognitive Function: A Focused Review", *Frontiers in Physiology* 6 (2016).
- 147 E.-S. Im, J. Pal ja E. Eltahir, "Deadly heat waves projected in the densely populated regions of South Asia", *Science Advances* 3.8 (2017), 1–7.
- 148 J. Zhang et al., "Labrador Sea freshening linked to Beaufort Gyre freshwater release", *Nature Communications* 12 (2021), 1–8.
- 149 L. Caesar et al., "Current Atlantic Meridional Overturning Circulation weakest in last millennium", *Nature Geoscience* 114 (2021), 118–20; D. Thornalley et al., "Anomalously weak Labrador Sea convection and Atlantic overturning during the past 150 years", *Nature* 556 (2018), 227–30.
- 150 S. Peyrouse, *The Nexus of Environmental Issues, Poverty, and Political Authoritarianism in Central Asia*, Central Asia Program, IERES, George Washington University (2022), 10.
- 151 P. Wester et al., *The Hindu Kush Himalaya Assessment: Mountains, Climate Change, Sustainability and People* (Cham, 2019).
- 152 C. Xu et al., "Future of the human climate niche", *PNAS* 117 (2020), 11,350–5.
- 153 R. Reuveny, "Climate change-induced migration and violent conflict", *Political Geography* 26 (2007), 656–73; G. Abel, "Climate, conflict and forced migration", *Global Environmental Change* 54 (2019), 239–49.
- 154 A. Ahmadalipour, H. Moradkhani ja M. Kumar, "Mortality risk from heat stress expected to hit poorest nations the hardest", *Climatic Change* 152 (2019), 569; T. Lok Wu, "Countries with Water Scarcity Right Now", Earth.org, 13.8.2022.
- 155 D. Dennis, "Southeast Asia's Coming Climate Crisis", Centre for Strategic and International Studies, 22.5.2020.
- 156 T. Middendorp ja R. Bergema, "The Warning Signs are Flashing Red: The Interplay between Climate Change and Violent Extremism in the Western Sahel", International Centre for Counter-Terrorism (2019), 2–4.

- 157 Yhdysvaltain puolustusministeriö, *Quadrennial Defense Review Report 2010* (Washington, DC, 2010), 84–5.
- 158 President Obama, "Presidential Memorandum – Climate Change and National Security", Valkoinen talo, 21.9.2016.
- 159 Crawford, "Pentagon Fuel Use, Climate Change and the Costs of War", 27–8; Office of the Under Secretary of Defense for Acquisition and Sustainment, *Report on the Effects of a Changing Climate to the Department of Defense* (2019), 5.
- 160 D. Sterletskiy et al., "Assessment of climate change impacts on buildings, structures and infrastructure in the Russian regions on permafrost", *Environmental Research Letters* 14 (2019), 1–15.
- 161 N. Nikiforova ja A. Konnov, "Influence of permafrost degradation on piles bearing capacity", *Journal of Physics: Conference Series* 1928 (2021), 1–6.
- 162 L. Khrustalev ja I. Davidova, "Forecast of climate warming and account of it at estimation of foundation reliability for buildings in permafrost zone", *Earth Cryosphere* 11 (2007), 68–75.
- 163 Y. Yau ja S. Hasbi, "A review of climate change impacts on commercial buildings and their technical services in the tropics", *Renewable and Sustainable Energy Reviews* 18 (2013), 430–41.
- 164 Ministry of Natural Resources and Ecology, Russian Federation, "О состоянии и об охране окружающей среды Российской Федерации в 2017 году" (Moskova, 2018).
- 165 E. Simonova et al., "Сибирская язва на Ямале: Оценка эпизоотологических и эпидемиологических рисков", Проблемы Особо Опасных Инфекций 1 (2017), 89–93; V. Yastrebov, "Эпидемиология трансмиссивных клещевых инфекций в России", Здоровье Населения и Среда Обитания 11 (2016), 8–12.
- 166 C. Hickman et al., "Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey", *Lancet Planetary Health* 5 (2021), 863–73.
- 167 R. Gray, "The people fighting the war on waste at music festivals", BBC News, 27.6.2019; E. Santillo, "Glastonbury Festival clean-up: How much does it cost to clean Worthy Farm and what happens to the waste?", Somerset Live, 27.6.2022; J. Halliday, "Greta Thunberg makes surprise appearance at Glastonbury festival", *Guardian*, 25.6.2022.
- 168 S. Helm, J. Kemper ja S. White, "No future, no kids – no kids, no future?", *Population and Environment* 43 (2021), 108–29; C. Cain Miller, "Americans are Having Fewer Babies. They Told Us Why", *New York Times*, 5.7.2018.

- 169 "When the Duke of Sussex Interviewed Dr Jane Goodall about the Future of Sustainability", *Vogue*, elokuu 2019; Population Matters, "World Population Day 2021: Change Champions", 11.7.2021.
- 170 Yhdistyneet kansakunnat, *Global Land Outlook, Second Edition: Land Restoration for Recovery and Resilience* (Bonn, 2022).
- 171 L. Warszawski et al., "All options, not silver bullets, needed to limit global warming to 1.5 °C: a scenario appraisal", *Environmental Research Letters* 16 (2021), 1–14.
- 172 L. Vargas Zeppetello, A. Raftery ja D. Battisti, "Probabilistic projections of increased heat stress driven by climate change", *Communications Earth & Environment* 3 (2022), 1–7.
- 173 Yhdistyneet kansakunnat, "Secretary-General's video message to the Petersberg Dialogue", 18.7.2022.
- 174 C. Mora et al., "Global risk of deadly heat", *Nature Climate Change* 7 (2017), 501–6.
- 175 H. Song et al., "Thresholds of temperature change for mass extinctions", *Nature Communications* 12 (2021), 1–8; C. Román-Palacios ja J. Wiens, "Recent responses to climate change reveal the drivers of species extinction and survival", *PNAS* 117 (2020), 4211–17; R. Cowie, P. Bouchet ja B. Fontaine, "The Sixth Mass Extinction: fact, fiction or speculation?", *Biological Reviews* 97 (2022), 640–63; L. Kemp et al., "Climate Endgame: Exploring catastrophic climate change scenarios", *PNAS* 119 (2022), 1–9.
- 176 European Commission, *Drought in Europe: August 2022* (Brussels, 2022); European Commission, "Daily News", 23.8.2022.
- 177 Ks. myös note M. Cruz, "El Gobierno limitará el aire acondicionado a 27 grados en transportes, centros de trabajo y comercios y la calefacción a 19", *El Mundo*, 29.7.2022.
- 178 International Monetary Fund, *World Economic Outlook: A Long and Difficult Ascent* (Washington, DC, 2020), 86.
- 179 D. Vetter, "'Who Cares if Miami is 6 Meters Underwater in 100 Years?': HSBC Executive's Incendiary Climate Comments", *Forbes*, 20.5.2022.
- 180 D. Strauss, "Central bankers plan for disruption caused by climate change", *Financial Times*, 22.1.2019.
- 181 L. Fink, "A Fundamental Reshaping of Finance", Larry Fink's 2020 Letter to CEOs, Black Rock, 16.1.2020.
- 182 M. Burke, S. Hsiang ja E. Miguel, "Global non-linear effect of temperature on economic production", *Nature* 527 (2015), 235–9.

- 183 J. Hickel et al., "National responsibility for ecological breakdown: a fair-shares assessment of resource use, 1970–2017", *Lancet Planetary Health* 6 (2022), 342–9.
- 184 M. Howerton, "New York City Energy Use All over Map", *Wall Street Journal*, 1.2.2012.
- 185 International Energy Agency, *Africa Energy Outlook 2022* (2022), 15–17.
- 186 African Development Bank, "Africa Economic Outlook 2022", <https://www.afdb.org/en/knowledge/publications/african-economic-outlook>
- 187 S. Wagstyl, "Climate change is becoming less a battle of nations than rich vs poor", *Financial Times*, 21.5.2021.
- 188 B. Goldstein, D. Gounaris ja J. Newell, "The carbon footprint of household energy use in the United States", *PNAS* 117 (2020), 19,122–30.
- 189 C. Tessum et al., "PM_{2,5} polluters disproportionately and systemically affect people of color in the United States", *Science Advances* 7 (2021), 1–6.
- 190 T. Carleton et al., "Valuing the Global Mortality Consequences of Climate Change Accounting for Adaptation Costs and Benefits", *Quarterly Journal of Economics* (2022).
- 191 Burke, Hsiang ja Miguel, "Global non-linear effect of temperature", 235; M. Dell, "Temperature Shocks and Economic Growth: Evidence from the Last Half Century", *American Economic Journal: Macroeconomics* 4 (2012), 66–95.
- 192 S. Hallegatte ja J. Rozenberg, "Climate Change through a Poverty Lens", *Nature Climate Change* 4 (2017), 250–6.
- 193 Vargas Zeppetello, Raftery ja Battisti, "Probabilistic projections", 1–7.
- 194 Armstrong Mackay et al., "Exceeding 1.5 °C global warming", 1–11.
- 195 "Mongolia, Russia to reap benefits from climate change", *World Economic Outlook: Seeking Sustainable Growth: Short-Term Recovery, Long-Term Challenges* (Washington, DC, 2017).
- 196 Ministry of Natural Resources and Environment of the Russian Federation, *Об Охране Окружающей Среды* (Moskova, 2018); "Голод, мор, смерть и деформация железнодорожных путей", *Kommersant*, 6.9.2018.
- 197 F. Pearce, "Global Warming will hurt Russia", *New Scientist*, 3.10.2003.
- 198 A. Lustgarten, "The Big Thaw: How Russia Could Dominate a Warming World", *ProPublica*, 16.12.2020.
- 199 R. Schoonover, C. Cavallo ja I. Caltabiano, *The Security Threat that Binds Us: The Unraveling of Ecological and Natural Security and What the United States Can Do about It*, toim. E. Femia ja A. Rezzonico, The

Converging Risks Lab, Council on Strategic Risks (Washington, DC, 2021), 6.

LOPUKSI

- 1 M. Le Page, "Heatwave in China is the most severe ever recorded in the world", *New Scientist*, 23.8.2022.
- 2 David Frost, *Holy Illusions: Reality-Based Politics and Sustaining the Brexit Revolt*, Policy Exchange (2022), 14–15.
- 3 J. Mervis, "From a bully pulpit, Ted Cruz offers his take on climate change", *Science Insider*, 9.12.2015.
- 4 M. Joyella, "On Fox, Donald Trump Calls Climate Change A 'Hoax': 'In The 1920's They Were Talking About Global Freezing'", *Forbes*, 21.3.2022.
- 5 M. Lempriere, "Energy sector hits back as Truss dubs solar farms 'paraphernalia'", Solar Power Portal, 16.8.2022.
- 6 CarbonBrief, "Factcheck: Is solar power a 'threat' to UK farmland?", 25.8.2022.
- 7 T. Marlow, S. Miller ja J. Timmons Roberts, "Bots and online climate discourses: Twitter discourse on President Trump's announcement of U.S. withdrawal from the Paris Agreement", *Climate Policy* 21 (2021), 765–77.
- 8 Ks. esim. Lomborg, "Welfare in the 21st century", 1–35.
- 9 M. Smith, *Water Efficiency Opportunities Best Practice Guides* (Canberra, 2011).
- 10 Greenstone, Hasenkopf ja Lee, *Air Quality Life Index*, 18.
- 11 G. Zissis, P. Bertoldi ja T. Serrenho, *Update on the status of LED-lighting world market since 2018*, European Commission, JRC Technical Report (Luxemburg, 2021), 3–4, 35–6.
- 12 Euroopan komissio, "Progress made in cutting emissions", https://ec.europa.eu/clima/policies/strategies/progress_en.
- 13 Rhodium Group, *Taking Stock 2022: US Greenhouse Gas Emissions Outlook in an Uncertain World*, 14.7.2022.
- 14 D. Wallace-Wells, "The Green Transition is Happening Fast: The Climate Bill Will Only Speed It Up", *New York Times*, 17.8.2022.
- 15 D. Tong et al., "Geophysical constraints on the reliability of solar and wind power worldwide", *Nature Communications* 12 (2021), 1–12.
- 16 S. Roth, "California just hit 95% renewable energy. Will other states come along for the ride?", *Los Angeles Times*, 29.4.2021.
- 17 J. Bairstow, "Coal-free period of generation comes to an end ... and was it due to Love Island?", *Energy Live News*, 6.6.2019.

- 18 D. Grant, D. Zelinka ja S. Mitova, "Reducing CO₂ emissions by targeting the world's hyper-polluting power plants", *Environmental Research Letters* 16 (2021), 1–10.
- 19 R. Way et al., "Empirically grounded technology forecasts and the energy transition", *Joule* 6 (2022), 1–26.
- 20 R. Teoh et al., "Mitigating the Climate Forcing of Aircraft Contrails by Small-Scale Diversions and Technology Adoption", *Environmental Science & Technology* 54 (2020), 2941–50.
- 21 G.L. Reynolds, *The Multi-Issue Mitigation Potential of Reducing Ship Speeds* (Lontoo, 2019); R. Leaper, "The Role of Slower Vessel Speeds in Reducing Greenhouse Gas Emissions, Underwater Noise and Collision Risk to Whales", *Frontiers in Marine Science* 6 (2019), 1–8.
- 22 N. Dirksen et al., "Learned control of urinary reflexes in cattle to help reduce greenhouse gas emissions", *Current Biology* 31 (2021), 1033–4.
- 23 Y. Ling Chin, K. Fie Chai ja W. Ning Chen, "Upcycling of brewers' spent grains via solid-state fermentation for the production of protein hydrolysates with antioxidant and techno-functional properties", *Food Chemistry: X* 13 (2022), 1–10.
- 24 F. Humpenöder et al., "Projected environmental benefits of replacing beef with microbial protein", *Nature* 605 (2022), 90–6.
- 25 B. Trang et al., "Low-temperature mineralization of perfluorocarboxylic acids", *Science* 377 (2022), 839–45.
- 26 E. Sheridan et al., "Plastic pollution fosters more microbial growth in lakes than natural organic matter", *Nature Communications* 13 (2022), 1–9.
- 27 A. de Souza et al., "Soybean photosynthesis and crop yield are improved by accelerating recovery from photoprotection", *Science* 377 (2022), 851–4.
- 28 V. Smil, *Numbers Don't Lie* (Lontoo, 2020), 147–8.
- 29 C. Henshaw, "Wind turbine blades could be recycled into gummy bears, scientists say", *Guardian*, 23.8.2022.
- 30 F. Parker-Jurd et al., "Investigating the sources and pathways of synthetic fibre and vehicle tyre wear contamination into the marine environment", Department for Environment, Food and Rural Affairs (2019), 3–4; N. Evangelou, "Atmospheric transport is a major pathway of microplastics to remote regions", *Nature Communications* 11 (2020), 1–11.
- 31 Emissions Analytics, "Tyres Not Tailpipe", 29.1.2020.
- 32 OECD, *Non-Exhaust Particulate Emissions from Road Transport: An Ignored Environmental Policy Challenge* (Pariisi, 2020).

- 33 BASIS, *Hit for Six: The Impact of Climate Change on Cricket* (2019).
- 34 M. Matiu ja F. Hanzer, "Bias adjustment and downscaling of snow cover fraction projections from regional climate models using remote sensing for the European Alps", *Hydrology and Earth Science Systems* 26 (2022), 3037–54.
- 35 Box, "Greenland ice sheet climate disequilibrium", I–II.
- 36 Lorenzo, Díaz-Poso ja Royé, "Heatwave intensity on the Iberian Peninsula", 1–10.
- 37 M. Wang et al., "The great Atlantic *Sargassum* belt", *Science* 365 (2019), 83–7.
- 38 M. Lowen, "Spain's olive oil producers devastated by worst ever drought", BBC News, 29.8.2022. Pitkäikäisyydestä Välimeren alueella ks. A. Campanella et al., "The effect of the Mediterranean Diet on lifespan: a treatment-effect survival analysis of a population-based prospective cohort study in Southern Italy", *Journal of Epidemiology* 50 (2021), 245–55.
- 39 Mekkaan liittyen ks. Wallace-Wells, *Uninhabitable Earth*, 42.
- 40 Yhdistyneet kansakunnat, "Humanity's just one misunderstanding away from 'nuclear annihilation' warns UN chief", 1.8.2022.
- 41 C. Bardeen et al., "Extreme Ozone Loss Following Nuclear War Results in Enhanced Surface Ultraviolet Radiation", *JGR Atmospheres* 126 (2021), 1–22.
- 42 L. Xia et al., "Global food insecurity and famine from reduced crop, marine fishery and livestock production due to climate disruption from nuclear war soot injection", *Nature Food* 3 (2022), 586–96; NASA, "Study Projects a Surge in Coastal Flooding, Starting in 2030s", 7.7.2021; L. Li, "A modest 0.5-m rise in sea level will double the tsunami hazard in Macau", *Science Advances* 4 (2018), 1–II; UNESCO, "UNESCO will train 100% of at-risk coastal communities by 2030", 22.6.2022.
- 43 Presidential Executive Order, "Executive Order – Coordinating Efforts to Prepare the Nation for Space Weather Events", Valkoinen talo, president Barack Obama, 13.10.2016.
- 44 D. Baker et al., "A major solar eruptive event in July 2012: Defining extreme space weather scenarios", *Space Weather* 11 (2013), 585–91.
- 45 www.spaceweather.com; J. Liu, "Solar flare effects in the Earth's magnetosphere", *Solar Physics* 17 (2021), 807–21; S. Shankland, "We aren't ready for a solar storm smackdown", *CNET*, 14.6.2016.
- 46 J. Lin et al., "Magnitude, frequency and climate forcing of global volcanism during the last glacial period as seen in Greenland and Antarctic ice cores (60–9 ka)", *Climate of the Past* 18 (2022), 485–506.

- 47 T. Gilchrist, "Effects of an impact event: an analysis of asteroid 1989FC", <https://www.brookes.ac.uk/geoverse/original-papers/effects-of-an-impact-event--an-analysis-of-asteroid-1989fc/>
- 48 NASA, "NASA Analysis: Earth is Safe from Asteroid Apophis for 100-Plus Years", 26.3.2021, <https://www.nasa.gov/feature/jpl/nasa-analysis-earth-is-safe-from-asteroid-apophis-for-100-plus-years>.
- 49 NASA, <https://www.nasa.gov/planetarydefense/dart>.
- 50 P. Huybers ja C. Langmuir, "Feedback between deglaciation, volcanism, and atmospheric CO₂", *Earth and Planetary Science Letters* 286 (2009), 470–91; S. Watt, D. Pyle ja T. Mather, "The volcanic response to deglaciation: Evidence from glaciated arcs and a re-assessment of global eruption records", *Earth-Science Reviews* 122 (2013), 77–102.
- 51 D. Trilling et al., "The Size Distribution of Near-Earth Objects Larger Than 10m", *Astronomical Journal* 154 (2017), 1–10.
- 52 NASA Earth Observatory, "Dramatic Changes at Hunga Tonga-Hunga Ha'apai", 10.4.2021.
- 53 NASA Earth Observatory, "Tonga Volcano Plume Reached the Mesosphere", 15.1.2022; M. Sharma ja S. Scarr, "Tonga Eruption: The Perfect Storm", Reuters, 14.2.2022.
- 54 C. Wright et al., "Surface-to-space atmospheric waves from Hunga Tonga-Hunga Ha'apai eruption", *Nature* (2022).
- 55 US Geological Survey, "Volcano Watch", 11.3.2021, <https://www.usgs.gov/center-news/volcano-watch-failing-prepare-you-are-preparing-fail-benjamin-franklin>.
- 56 L. Mani, A. Tzachor ja P. Cole, "Global catastrophic risk from lower magnitude volcanic eruptions", *Nature Communications* 12 (2021), 1–5.
- 57 R. Munoz, "Seeing Change in Weather Modification Globally", Maailman ilmatieteen järjestö WMO, *Bulletin* 66 (2017).
- 58 R. Radwan, "How artificial rain can make a difference to Saudi Arabia and Gulf region's water situation", *Arab News*, 27.5.2022.
- 59 A. Griffin, "Russia spends millions on 'cloud seeding' technology to ensure it doesn't rain on May Day public holiday", *Independent*, 2.5.2016; M. Williams Pontin, "Weather Engineering in China", *MIT Technology Review*, 25.3.2008.
- 60 J. Wei, "Cloud and precipitation interference by strong low-frequency sound wave", *Science China Technological Sciences* 64 (2021), 261–72; ks, myös G. Wang et al., "Sky River: Discovery, concept, and implications for future research", *Science China Technological Sciences* 46 (2016), 649–56.

- 61 Kiinan kansantasavallan valtioneuvosto, "China allocates 8.8b yuan for weather modification program", 21.9.2017; Kiinan kansantasavallan valtioneuvosto, "China to forge ahead with weather modification service", 2.12.2020.
- 62 S.-S. Chien, D.-L. Hong ja P.-H. Lin, "Ideological and volume politics behind cloud water resource governance – Weather modification in China", *Geoforum* 85 (2017), 225–33.
- 63 National Research Council, *Climate Intervention: Reflecting Sunlight to Cool Earth* (Washington, DC, 2015), x.
- 64 NOAA, "Weather Modification Project Reports", <https://library.noaa.gov/Collections/Digital-Collections/Weather-Modification-Project-Reports>.
- 65 J. Dineen, "Can Cloud Seeding Help Quench the Thirst of the U.S. West?", *Yale Environment 360*, 3.3.2022; S. Tsiouris et al., "Soil silver content of agricultural areas subjected to cloud seeding with Silver Iodide", *Fresenius Environmental Bulletin* 11 (2002), 697–702; B. Williams, "An assessment of the environmental toxicity of silver iodide – with reference to a cloud seeding trial in the snowy mountains of Australia", *Journal of Weather Modification* 41 (2009), 75–96.
- 66 Ks. esim. luettelo papereista, jotka esitettiin Wyomingin yliopiston konferenssissa (22nd Conference on Planned and Inadvertent Weather Modification) 13–16.1.2020, <https://ams.confex.com/ams/2020Annual/webprogram/22WXMOD.html>.
- 67 J. Zheng, "Project aims to divert water through the sky", *China Daily*, 14.9.2016.
- 68 National Research Council, *Climate Intervention*, 7.
- 69 Panel on Policy Implications of Greenhouse Warming Committee on Science, Engineering, and Public Policy, *Policy Implications of Greenhouse Warming: Mitigation, Adaptation, and the Science Base* (Washington, DC, 1992), 48–65.
- 70 National Research Council, *Critical Issues in Weather Modification Research* (Washington, DC, 2003), 3–5.
- 71 Ibid., 73.
- 72 National Research Council, *Climate Intervention*, 1–12.
- 73 National Academies of Sciences, Engineering, and Medicine, *Reflecting Sunlight: Recommendations for Solar Geoengineering Research and Research Governance* (Washington, DC, 2021).
- 74 Ks. esim. M. Lawrence, "Evaluating climate geoengineering proposals in the context of the Paris Agreement temperature goals", *Nature Communications* 9 (2018), 1–19; D. MacMartin, K. Ricke ja D. Keith, "Solar geoengineering as part of an overall strategy for meeting the

- 1.5°C Paris target”, *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 376 (2017), 1–19; Y. Fan et al., “Solar geoengineering can alleviate climate change pressures on crop yields”, *Nature Food* 2 (2021), 373–81.
- 75 Yhdistyneet kansakunnat, *Global Land Outlook*, p. 149.
- 76 <https://www.overshootday.org/>.
- 77 E. Crist, “On the Poverty of our Nomenclature”, *Environmental Humanities* 3 (2013), 129–47; D. Kidner, “Why ‘anthropocentrism’ is not anthropocentric”, *Dialectical Anthropology* 38 (2014), 465–80.
- 78 Milton, *Paradise Lost*, 10, 260–1.
- 79 *The Ante-Nicene Fathers: Translations of the Writings of the Fathers down to AD 325*, toim. ja kään. A. Roberts ja J. Donaldson, 10 vols (Edinburgh, 1869), 9, 145–6.
- 80 Koraani, 36:56–7, tr. N. Dawood (Lontoo, 2014), p. 443; Brhad-aranyaka, *Upanishad II*, V Brahmana.1.
- 81 J. Mohawk, *Utopian Legacies: A History of Conquest and Oppression in the Western World* (Santa Fe, 2000), p. 17.
- 82 *The Economics of Biodiversity: The Dasgupta Review* (Lontoo, 2021), 1–2.
- 83 Ibid., p. 2.