

*INDEX*

Illustrations are indicated by italics  
 0540–69.3, pulsar, 21  
 acid rain, and extinction, 45  
 alcohol, and health, 185–7, 186  
 allopatric speciation, 95–6; *and see*  
     speciation  
 amino acids, extraterrestrial, 50  
 ammonites, extinction of, 29–31, 32  
 Anatolia (Turkey), famine (1560–1620),  
     175  
 animal behaviour, and earthquakes,  
     114–15  
 Athens (Greece), earthquakes, 121  
 Atlantis, earthquakes, 121  
 atmospheric boundary layer, 135–6  
 Bangladesh, famine (1974–5), 164  
 BCG vaccine, 181, 181  
 Beddoes, Thomas, 191; on tuberculosis,  
     191–6  
 Bengal (India), famine (1943), 164, 176  
 bifurcation, 84, 85, 96  
 Big Bang, 6  
 black holes, 22  
 body wave magnitude ( $m_b$ ), 108  
 Brighton Chain Pier, 128  
 Buckland, William, and catastrophism,  
     74–7, 79–80  
 Building Research Establishment, wind  
     data, 136  
 buildings: and earthquakes, 124, 125;

storm damage, 127–8, 130–1, 137–44;  
 and wind resistance, 127–8, 130, 134–7  
 cachexies, eighteenth century, 187  
 canalisation, 86, 88–9, 98–9, 99, 100  
 Caravaca (Spain), K–T boundary, 33, 41  
 Cassiopeia A, 26  
 catastrophe theory, and evolution, 83–101  
 catastrophism, 52–4, 60–1, 67–74, 80–2  
 Charleston (USA), hurricane damage,  
     140–4, 141, 142, 143  
 Charpentier, Jean de, and glaciation, 78,  
     78–9  
 Cheyne, George, 188–9; on health, 189–90  
 Chile, earthquakes, 117, 118, 118; 1835  
     earthquake, 116; 1960 earthquake, 108,  
     116  
 China: 1976 earthquake, 103, 122; famine,  
     147, 177; 1959–61 famine, 164, 170  
 Coalinga (USA), earthquake (1983), 118  
 cobalt, and radioactive decay, 23  
 comet storms, 47, 49–50  
 companion star hypothesis, 47–8  
 consumption: causes of, 187–8; symptoms,  
     180; *and see* tuberculosis  
 consumption (economic), and disease,  
     182–3  
 Coriolis effect, 129  
 cosmic rays, 25–7  
 Courillot, Vincent, and extinction  
     theories, 36–7  
 crude death rate, famine, 164; *and see*  
     death tolls

## Index

- cusp catastrophes, 92–5, 93; *and see* catastrophe theory
- cyclones, 133–4; *and see* tropical cyclones
- Dante, on hunger, 145, 146
- Darwin, Charles, 57, 59; on earthquakes, 116, 124; evolution theory, 83–4; and geology, 57, 59–60, 74; and Lyell, 59–60, 67; *Origin of Species, The*, 83–6, 90, 97–8
- Darwin, Erasmus: on health, 184, 186; on tuberculosis, 191
- Darwin (Australia), tropical cyclone damage, 139–40
- De La Beche, Henry, on uniformitarianism, 60, 60, 65, 66, 70
- de Waal, Alex, on famine, 161–2
- death tolls: earthquakes, 102–3, 122, 126; famine, 156, 158, 163–5; tuberculosis, 181; *and see* mortality rates
- Deccan Traps (India), volcanism, 36–7, 51–2
- density of matter, 21
- diet, 189–90: and health, 183–7, 186, 194–5; and tuberculosis, 187, 194–5
- dilatancy, 114
- diluvialism, 74–7
- dinosaurs, extinction theories, 36–7
- dip-slip faulting, 108–11, 109; *and see* faults
- discontinuities: in form, 86–7, 87; in space, 85–6, 92–4, 95; in time, 84–5, 89–91, 95
- disease: eighteenth century, 187–90; and famine, 165–8; and evil, 179; occupational (nineteenth century), 191–2; *and see* tuberculosis
- Doldrums, 129
- drought, and famine, 174–5
- Earth: age of, 10; plates, 111–13, 113; structure of, 33, 72–3, 103, 105, 105–7
- earthquakes, 102–26; and animal behaviour, 114–15; and buildings, 124, 125; chronology of, 119–24; Darwin on, 116, 124; death tolls in, 102–3, 122, 126; frequency of, 102–3, 122–3; Gibbon on, 124, 126; Lyell on, 102, 115–16; measurement of, 107–8; and mountains, 116, 118–19; movement type of, 108–11, 109, 110; number of, 102–3; prediction of, 114–15, 119–24; prevention of, 124, 126; social effects of, 124–6
- Earthquakes, Lectures and Discourses of (Hooke)*, 115
- economics: and famine, 176–7; and tuberculosis, 182–3, 191–2, 197–9
- education, and health, 192
- Egypt, and famine, 148, 149, 168, 171, 176
- El Asnam (Algeria), earthquakes, 126; 1980 earthquake, 110–11, 111, 112, 118, 119
- elastic rebound theory, 118
- elementary catastrophes, 95; *and see* catastrophe theory
- elements, abundance of, 14, 15, 24, 40; *and see* iridium, iron
- Elie de Beaumont, Léonce, and mountain age theory, 70–3, 72–3
- emigration, and famine, 168–9
- English famines: (1315–16), 164; (1586), 171–3, 172; (1596–7), 164; (1623–4), 164
- English Malady, 189–90
- entitlement, and famine, 173
- epicentres, in earthquakes, 103
- Epidaurus, earthquakes, 126
- Ethiopia, famine (1983–5), 161
- evolution, 54–5; and catastrophe theory, 83–101; and cosmic rays, 26–7; Darwin on, 83–6, 90, 97–8; and luck, 54–5; mathematical model of, 87–9; stellar, 6, 11–14, 19; of the Sun, 10, 25
- extinction: and acid rain, 45; and ammonites, 29–31, 32; and dinosaurs, 36–7; and fire, 45; and greenhouse effect, 45; impact theory of, 37, 39–46, 52, 54; and luck, 54–5; and meteorites, 37, 39–46, 52, 54; periodicity, 46–8; and volcanoes, 36–7, 41–2, 50–2
- famine: causes of, 174–8; criteria for, 163–74; death tolls, 156, 158, 163–5; definitions of, 147–9, 159, 161–3, 164, 167–8; and disease, 165–8; documentation of, 159–62; and drought, 174–5; and economic structure, 176–7; and emigration, 168–9; and entitlement, 173; frequency of, 147; and migration, 168–9; mortality rates, 163–5; and politics, 170–4; and society, 150–6, 159, 169–74; and tree ring analysis, 175; *and see* food crisis, hunger
- fashion, and tuberculosis, 191–3
- faults, 108–13, 109, 110, 111, 120–3
- Finland, famine (1696–7), 171

## Index

- fire, and extinction, 45
- Florence (Italy), famines (1371–1791), 147, 150–6, 151, 152, 153, 154, 155, 156
- food crisis: definition, 150; continuum, 157–63; shortage, 149–50; *and see* famine
- form, discontinuities in, 86–7, 87
- frontal depressions, 129–30
- frontiers, between species, 85–6
- galaxies, 8, 24
- Galen, on disease, 166–7
- gamma rays, from supernovae, 23
- Gartner, Stefan, on extinction, 36
- geology: and Darwin, 57, 59–60, 74; and Lyell, 59–65, 60, 64, 67–8; *and see* catastrophism, uniformitarianism
- Geology, Principles of* (Lyell), 62–5, 64, 67–8, 102, 115–16
- Gibbon, on earthquakes, 124, 126
- glaciation, 77–80
- gold:iridium ratios, 39; *and see* iridium
- Grand Unified Theories (GUTs), 19
- Great Famine (1315–16), 164
- Great Potato Famine (1846–50), 156, 160–1, 164–5
- greenhouse effect, and extinction, 45
- Gubbio (Italy), K–T boundary, 32–6, 35
- Gumbel method of wind prediction, 130
- GUTs (Grand Unified Theories), 19
- Hadley cells, 128–9
- health; and alcohol, 185–7, 186; and diet, 183–7, 186, 194–5; and education, 192; and fashion, 191–3; and masturbation, 192, 193, 198; and society, 182–3, 197–9
- Helice (Greece), earthquakes, 121–2
- Homer, on hunger, 145
- Honshu (Japan), 1896 earthquake, 103
- Hooke, Robert, on earthquakes, 115, 115
- Horse latitudes, 129
- hunger, endemic, 146, 148–9; *and see* famine
- hurricanes, 133, 140–4, 141, 142, 143; *and see* cyclones
- impact theory of extinction, 37, 39–46, 52, 54
- impact winter, 44–5
- Iraq, earthquakes, 122
- Ireland: emigration, 169; famine (1846–50), 156, 159–60, 160, 164–5, 171, 174
- iridium, 33–7, 35, 38, 39–40; *and see* elements
- iron, and stellar evolution, 12–13, 15, 22, 33; *and see* elements
- Irpinia (Italy), 1980 earthquake, 104
- Jenner, Edward, on diet, 184–5
- Jordan Rift Valley, 113
- K–T boundary, 29–37, 30–1, 35, 38, 39–44, 50–1
- K–T boundary iridium anomaly, 34, 35, 37, 39, 42
- Kilauea Volcano (Hawaii), iridium levels, 39
- L waves, 107
- Large Magellanic Cloud, 7–9, 16, 21
- Lenzi, Domenico, on Florence food crisis (1329), 150–6
- Lesotho, food emergencies (1983–5), 161
- light years, 7–8
- Lisbon (Portugal), earthquake (1755), 102
- lithosphere, 105, 112, 113
- Lyell, Charles, 53, 67–8, 74, 81; and Darwin, 59–60, 67; on earthquakes, 102, 115–16; geological theories, 59–65, 60, 64, 67–8; and glaciation, 80; *Principles of Geology*, 62–5, 64, 67–8, 102, 115–16
- Managua (Nicaragua), earthquakes, 126
- Manson, Iowa (USA), meteorite impact crater, 41–2, 48–9
- masturbation, and health, 192, 193, 198
- matter, density of, 21
- Maxwell lines, 93, 94
- Maxwell points, 93, 94
- $m_b$  (body wave magnitude), 108
- Mercalli scale, 107
- meteorites: and extinction theories, 37, 39–46, 52, 54; impact craters, 41–2, 48–9; impact of, 42–4, 49–50; metal content, 39–40
- migration, and famine, 168–9
- Milky Way galaxy, 7, 24
- Moho, 103, 105
- moral economy, 171–4, 177
- mortality rates: famine, 163–5; tuberculosis, 190–1, 197, 201–2; *and see* death tolls

## Index

- mountain age theory, 70–3, 72–3
- mountains, and earthquakes, 116, 118–19
- Mozambique, food emergencies (1982–5), 161
- $M_s$  scale (surface wave magnitude), 108
- multiple speciation, 84, 85, 96–9, 100; *and see* speciation
- mutation, 26–7
- $M_w$  scale, 108
- Mycenae, and famine, 174–5
- natural selection, 86, 88
- Nemesis theory, 47–8
- neutrinos, 14, 20
- neutron stars, 5, 21–2; *and see* stars, stellar evolution
- New Madrid (USA), earthquakes (1811–12), 113
- Nias Islands (Indonesia), earthquakes and architecture, 124, 125
- nickel, and radioactive decay, 23
- Niigata (Japan), 1964 earthquake, 114
- nuclear binding, 12
- nuclear cooking, 22–4
- nuclear fusion, 11, 11
- occupational diseases, nineteenth century, 191–2
- Origin of Species, The* (Darwin), 83–6, 90, 97–8
- osmium, 40
- P (primary) waves, 107, 109
- palaetiological sciences, 62, 65
- particle physics, 19
- Paterson, Marcus, on tuberculosis, 201
- Polar Front, 129
- politics, and famine, 170–4
- protons, 19–20
- pulsars, 21
- punctuated equilibria, 83–4, 90, 91
- punctuation points, 85, 96–9
- quartz, shocked, 38, 41–2
- radioactive decay, 23
- Reid, H F, elastic rebound theory, 118
- rhenium, 40
- Richter scale, 107–8
- Rome (Italy), earthquake (AD 365), 124, 126
- S (secondary or shear) waves, 107, 109, 113–14
- San Andreas fault, 113, 123
- San Fernando (USA), earthquake (1971), 103
- San Francisco (USA): 1906 earthquake, 108; 1989 earthquake, 103
- sanatoria, 199–201, 200
- Sanduleak–69 202, star, 10, 18–20, 22
- sciences, classification of, 62
- Scotland: emigration, 169; famine (1864–7), 160–1, 164
- Sedgwick, Adam, and catastrophism, 68–70
- seismic imaging/seismic tomography, 107
- Sen, Amartya, on famine, 145–6, 173
- Serapis, Temple of, 63–5, 64
- shear-wave splitting, 113–14; *and see* S waves
- singularities, 95
- SN 1987A: *see* Supernova 1987A
- social class, and tuberculosis, 197–9
- society: and earthquakes, 124–6; and famine, 150–6, 159, 169–74; and health, 182–3, 197–9
- solar radiation, 128
- Somers, Robert, on famine, 160–1
- Soviet Union, famine (1932–3), 156, 158, 164, 170
- space, discontinuities in, 85–6, 92–4, 95
- speciation, 86–7; *and see* canalisation, 99; *and see also* allopatric speciation, multiple speciation
- spectral gap, 135
- stars: chemical composition, 24; collapse of, 13–14; companion star hypothesis, 47–8; definition of, 9; neutron, 5, 21–2
- stellar evolution, 6, 11–14, 19
- Stevns Klint (Denmark), K-T boundary, 39–40, 50
- storm damage: Australia (1971) 139–40; buildings and man-made structures, 127–8, 130–1, 137–44; United Kingdom (1987), 138; United States of America (1989), 140–4, 141, 142, 143
- storm surges, 140
- strike-slip displacement, 108–11, 109; *and see* faults
- STRONGBLOW, 136
- subduction, 12–13
- subsistence crisis, definition, 150; *and see* food crisis

## Index

- Sun, 7–8, 24: energy output, 10–11; evolution of, 10, 25
- Supernova 1987A, 6–9, 9, 10, 16–27; brightness, 22
- supernovae: definition, 5, 14; effects of, 24–7
- surface wave magnitude ( $M_s$ ), 108
- Tacoma Narrows bridge, 128
- Tangshan (China), 1976 earthquake, 103, 122
- Tarantula Nebula, 9, 12
- Tay rail bridge, 128
- TB: *see* tuberculosis
- time: discontinuities in, 84–5, 89–91, 95; geological, 32
- tornadoes, 134–5, 143–4
- Townsville (Australia), tropical cyclone damage, 139–40
- Trade winds, 128–9
- transform faults, 112–13; *and see* faults
- tree ring analysis, and famine, 175
- tropical cyclones, 133, 139–40; *and see* cyclones
- tuberculosis: attraction of, 192–3; death toll resulting, 181; and diet, 187, 194–5; and economics, 182–3, 191–2, 197–9; and fashion, 191–3; mortality rate, 190–1, 197, 201–2; and social class, 197–9; treatment of, 196, 199–201; vaccination, 181, 181; *and see* consumption
- typhoons, 133; *and see* cyclones
- unfitness function, 88, 89, 91
- uniformitarianism, 52–4, 60, 60–7, 66, 70, 81–2; *and see* Lyell, Charles
- vaccination, tuberculosis, 181, 181
- Villani, Giovanni, on Florence food crisis (1329), 150, 152, 155
- volcanoes, and extinction theories, 36–7, 39, 41–2, 50–2
- Wales: 1984 earthquake, 119, 124; 1990 earthquake, 119
- Walter, J H, & Schofield, R, on famine, 167–8
- Ward, Peter, on extinction, 29–31
- wasting disease, seventeenth century, 187
- Whewell, William, on catastrophism, 60–2
- white plague: *see* tuberculosis
- Wilde, Sir William, on Irish famine, 159–60, 160
- wind climate, 128–9, 135
- wind engineering, 127–8
- wind resistance, and buildings, 127–8, 130, 134–7
- wind tunnels, 136–7
- winds: partial factor for, 131, 133; prediction of, 130–3, 132; return periods, 131–3, 132; speed profile, 135
- Woodcock, H de Carle, on tuberculosis, 198–9
- Woodeforde, Parson, on food, 185
- Zumaya (Spain), K–T boundary, 29–31
- Zwicky, Fritz, and supernovae, 17, 18, 26