THE ANTHROPIC PRINCIPLE

A Universe Built for Man

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Table of Contents

List of Figures v

Preface vii

CHAPTER ONE
The Copernican Principle or the Anthropic Principle? 1

CHAPTER TWO
God or Science? The Conflict that Never Was 11

CHAPTER THREE
The Miracle of Mathematics 21

CHAPTER FOUR
Finding God in the Micro World: The Standard Model of Particle Physics 31

CHAPTER FIVE
Finding God in the Macro World: The Cosmos 41

CHAPTER SIX
Our Cosmic Neighborhood 51

CHAPTER SEVEN
Our Very Special Earthly Home 61

CHAPTER EIGHT
Avoiding Anthropic Fine-Tuning with the Multiverse 71

CHAPTER NINE
The Molecules of Life 81

CHAPTER TEN
The Queen of all Scientific Problems: The Origin of Life 91

CHAPTER ELEVEN
DNA: God's Book of Life 103

CHAPTER TWELVE
Evolution by Natural Selection: Micro and Macro 113

CHAPTER THIRTEEN
I Am Fearfully and Wonderfully Made 125

CHAPTER FOURTEEN
Mind, Consciousness, Language, and Free Will 137

References 149

Index 161

List of Figures

Figure 3.1. The Golden Spiral and Rectangle Formed by the Fibonacci Sequence 27

Figure 4.1. Standard Model of Elementary Particles 33

Figure 5.1. The Timeline for the Expansion of Space from the Big Bang 46

Figure 6.1. The Electromagnetic Spectrum 56

Figure 7.1. Habitable Zones Around Different Types of Stars 61

Figure 8.1. The Triple-Alpha Process 86

Figure 11.1. The Making of a Protein 107

Figure 13.1. The Neuron and its Parts 133

Preface

The Copernican Principle has been used by some to state that humankind is an insignificant assemblage of chemical scum living on an accidental planet in a suburb of a purposeless universe. This scurrilous principle has been questioned by many prominent scientists, including Nobel laureate physicists, which has led physicists to propose the Anthropic Principle. This principle posits a purposeful link between the structure of the universe and the existence of humankind and its specialness. The numerous features of the universe are so freakishly fine-tuned for the existence of intelligent life that physicists are beginning to come to grips with the notion that our universe is profoundly purposeful and that there is a powerful and incredibly intelligent Mind behind it all.

The four primary versions of the principle are the: Weak Anthropic Principle (WAP), the Strong Anthropic Principle (SAP), the Final Anthropic Principle (FAP), and the Participatory Anthropic Principle (PAP). WAP simply says that our location in the universe is privileged because it is compatible with our existence, and SAP says that the universe had to result in the creation of intelligent life at some point. This implies purpose and deliberate design behind the universe. FAP says that once intelligent life comes into existence it will never die. The idea that God created the universe as a home for humans is unattractive to atheists, but a number of scientists have been forced to God by anthropic fine-tuning. PAP proposes that observers are necessary to bring the universe into existence. This is consistent with the standard interpretation of quantum mechanics. There is no quantum reality until an observer exists to witness wave collapse. PAP's idea is that an intelligent observer imparts reality to the universe, but if the pre-human universe was "observed" into being, the only candidate for the job must be the Ultimate Observer—God.

Chapter two examines the allegation that science and Christian theism are in conflict. Although it is true some *scientists* are at war with theism, *science* itself is not. The spirit of science grew out of the Christian belief in a rational and orderly God who created us in His image, and many of the advances in early science were made by men of God. Scientists readily acknowledge that the big questions of meaning are outside of their purview, so if we are to find answers to ultimate questions, we need both science and God. Science seeks answers to *how* God created the universe; theology searches for *why* He did. Science works within a materialist/naturalist framework, and this is amply justified. The problem comes when we jump from a working assumption to the assumption that there is nothing beyond the realm of the material/natural.

Mathematics is the subject of chapter three. Early scientists such as Copernicus, Galileo, Kepler, and Newton knew that the universe was capable of mathematical description because a rational God fashioned it in a rational way, and later Nobel laureates such as Roger Penrose and Paul Dirac have concurred. Mathematical truths represent the real world in abstract symbols and have been amazingly successful in doing so. I give examples of this, including the probability boundary—the point at which something improbable becomes impossible. I also look at the mysterious golden ratio, Fibonacci numbers, and the Fibonacci cascade that describe so many diverse and unrelated phenomena.

Chapter four addresses the Standard Model of particle physics, including the Higgs boson, whimsically nicknamed the "God Particle." Many physicists regard the Standard Model as highly "unnatural" because of the large number of parameters that are balanced on a razor's edge such that changing any of the values and we would have a universe without atoms. "Naturalness" is the prohibition of anthropic fine-tuning. Since we have a universe with fine-tuned to multiple trillions of degrees more than the Standard Model predicts, the unnatural universe must be supernatural. The four fundamental forces of nature—gravity, electromagnetism, and strong and weak nuclear forces—are addressed in terms of their remarkable fine-tuning.

We move from the micro to the macro in chapter five with the Big Bang. Before the Big Bang, almost all scientists believed that the universe was static and existed eternally. There was fierce opposition to the Big Bang theory because it is reminiscent of Genesis's creation from nothing. It was not until the evidence for an expanding universe was buttressed by the discovery of the cosmic microwave background radiation was discovered that almost all scientists accepted the Big Bang. I look at Penrose's calculations of the utter impossibility of getting the whole show on the road given that it had to begin with the lowest possible entropy level, the geography of the universe, and the "unnaturalness" of the cosmological constant.

Chapter six looks at our cosmic neighborhood—the Milky Way, other types of galaxies, and the process of nuclear fusion in stellar nucleosynthesis and supernovae. We are in the galaxy's "sweet spot:" referred to as the galactic habitable zone. For a variety of reasons, this is the only area suitable for life. The Sun's perhaps unique properties are examined and how they make our planet suitable for life such as its stable luminosity and its vital role in stabilizing the tides. I then look at other anthropic considerations relating to the Sun, and why it has been used as a metaphor for God.

We look at our prize patch of cosmic real estate called the Earth in chapter seven. The Earth is located in the solar system's Circumstellar Habitable Zone, which is a band of space around the Sun that is hospitable to life. The Earth's location, orbital eccentricity, mass, magnetic shield, plate tectonics, and ozone

layer, among many other things, contribute to its habitability. The wonders of photosynthesis, the process by which plants obtain their food and animals their oxygen, are then briefly discussed, along with the role of volcanoes. This is followed by a discussion of the Moon, Jupiter, and Saturn in making our planet safe and habitable.

The molecules of life are the topics of chapter eight, beginning with water. Despite its simple structure, water is the strangest liquid on the planet because it bends the rules of chemistry, but life is impossible without it. The same can be said of carbon because it forms the backbone of millions of organic compounds. Carbon is forged in the stars, but scientists were at a loss as to how until Fred Hoyle made his anthropic prediction that it was done via a "triple alpha" process. I then take a broader look at the marvel of photosynthesis, how it proceeds, and what it does for us in providing food and oxygen. I finish by looking at nitrogen, the most abundant element in the Earth's atmosphere and nature's chief fertilizer.

Many scientists hate the unnatural anthropic fine-tuning we observe and have turned to speculations about a multiverse to avoid it; posit enough universes and one can beat the odds of finding one with its parameters fine-tuned to such an incomprehensible degree as ours. Chapter nine examines the various multiverse models based on M theory, the mathematic basis for the multiverse. Multiverse proponents know that the theory cannot, even in principle, be empirically tested and argue for a relaxation of the way a theory should be accepted. Even if the multiverse turns out to be right, it does not mean that it would exclude God. If God is capable of creating one universe, He is capable of making trillions, so the choice is hardly God or the multiverse.

Chapter ten examines abiogenesis, the hypothetical process by which chemical evolution became biological evolution. The leap from non-living matter to living matter would require a set of random lifeless molecules to arrange themselves in specific and complex ways to gain both a metabolic and a reproductive capacity, the systems that define life. I examine the two major hypotheses of abiogenesis; the RNA world, and the metabolism first hypotheses, before looking at a newer idea that abstract information came first. Recognizing the difficulties for a naturalistic emergence of life on Earth, some have turned to the multiverse and to the notion of panspermia to get around it.

The cell, genome, and DNA are the topics addressed in chapter eleven. These marvels of nanotechnology are God's construction manuals that provide the information needed to build the proteins that build us. I briefly look at the structure and functions of various parts of the cell, the process of going from the information content of DNA to proteins, the intricacies of protein folding, and the work of the Encyclopedia of DNA Elements (ENCODE) consortium that

has found function in thousands of stretches of DNA that used to be dismissed as "junk DNA."

Darwin's evolution by natural selection is the topic of chapter twelve. While not disavowing it, there are many difficulties involved, including the huge "waiting time" involved even for the mutation of even a functioning enzyme to become a different one. Micro- versus macro-evolution, chance and necessity, the Cambrian explosion, punctuated equilibrium, and the tree of life are explored. After struggling with evolutionary theory for decades, I have allied myself with theistic evolution (TE). TE believes that God created all living things using the process of evolution in ways that conform to secular scientific accounts, but denies that evolution is undirected and purposeless. The ideas of major scientists and theologians, including Augustine and Thomas Aquinas, on TE are discussed.

Chapter thirteen discusses the human body, the most complex thing in the universe, and the brain, the most complex part of the body. We begin with the profound mystery of why the zygote exists because sexual reproduction seems highly unlikely given the "simplicity" of asexual reproduction. Mitosis and meiosis, the innate and acquired immune systems, the cardiovascular system, and the eye are discussed. This is followed by a discussion of the brain; God's magnum opus. We look at the various parts of the brain and their functioning, including the process of synaptogenesis, the process by which the brain incorporates environmental experiences into the brain's neurocircuitry, and why love is so important in this.

The final chapter addresses attributes of humans that most distinguish them from other animals—mind, consciousness, language, and free will. Materialists imagine that the mind is just the brain at work, but it is just as easy to imagine the opposite. Consciousness—being aware that we are aware—and communication via language has enabled humans to actively make their environments rather than merely adapting to them. But are we really only responding to our genetic makeup and environmental exigencies when we make decisions, or do we have free will? The answer to this depends on how we define free will and determinism. Neither free will nor determinism alone is sufficient to explain human behavior; we need both to do so.

CHAPTER ONE
The Copernican Principle or the Anthropic Principle?

The Copernican Principle

The Bible tells us that humans are made in the image of God, which means that humans hold a very privileged status in the universe. Non-believers may tell you that this is inexcusably arrogant and that Christians should learn some humility. Being made in the image of God does not mean humans are corporeal representatives of the imageless God; this reduces God to human proportions. So, what does it mean? Theologians have been arguing this for centuries. Is the meaning found in its relational sense; in the human capacity for a relationship with God and with one another? Is it the covenant we have with God, or perhaps it is something we *do* rather than what we are or what we have? In Genesis, God was creating and delegated us the authority to do the same: "Be fruitful, multiply, fill the earth, and subdue it." Thus, being made in the "likeness" of God, means doing on a human scale what He did—create, love, behave morally, justly, and mercifully. If we can do this, we are special.

Stephen Hawking says no! and that not only are we not special, we are downright insignificant: "just a chemical scum on a moderate-sized planet, orbiting around a very average star in the outer suburb of one among a hundred billion galaxies" (in Kahane, 2014, p. 745). We might call this the misanthropic principle. Others want to demote humans too, if not as low as chemical scum, at least to just another animal separated from the rest only by arrogance. It is often said that the image we have of ourselves contains our destiny. In *The Myth of Sisyphus*, atheist philosopher Albert Camus explored the absurdity of a Godless life shorn of meaning. The opening lines of his book are: "There is but one truly serious philosophical problem, and that is suicide. Judging whether life is or is not worth living amounts to answering the fundamental question of philosophy" (Camus, 1955, p. 3). If there is no purpose in life other than to indulge in our natural appetites promiscuously, as Camus advised, and if we believe that we are just "chemical scum" living on a paltry piece of space rock with no sense of ultimate meaning, we may indeed feel that life is not worth living.

The notion of human mediocrity asserts that intelligent life is likely duplicated on billions of other planets in the universe. It is more formally

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Figures

Figure 3.1. The Golden Spiral. Public Domain. https://commons.wikimedia.org/wiki/File:GoldenSpiralLogarithmic_color_in.gif

Figure 4.1. Standard Model of Elementary Particles. Public Domain https://commons.wikimedia.org/wiki/File:Standard_Model_of_Elementary_Particles.svg

Figure 5.1. Expansion of the Universe. Public Domain. https://commons.wikimedia.org/wiki/Commons:Featured_picture_candidates/File:CMB_Timeline300_no_WMAP.jpg.

Figure 6.1. Electromagnetic Spectrum. NASA Public Domain. https://imagine.gsfc.nasa.gov/science/toolbox/emspectrum1.html

Figure 7.1. Habitable Zones around Stars. NASA Public Domain. https://exoplanets.nasa.gov/search-for-life/habitable-zone/

Figure 8.1. The Triple Alpha Process. Public Domain. https://commons.wikimedia.org/wiki/File:Triple-Alpha_Process.svg.

Figure 11.1. The Making of a Protein. Public Domain. U.S. Department of Energy. http//:www.ornl.gov/hgmis.

Figure 13.1. Neuron and its Parts. Public Domain. https://en.wikipedia.org/wiki/Neuron#/media/File:Complete_neuron_cell_diagram_en.svg

Index

A

A Brief History of Time 23
abduction 7
Abel, David 98
abiogenesis 91, 96
abortive process 147
abstraction 75, 99
adaptive immune system 129
adenine (A) 104-105
adenosine triphosphate (ATP) 66, 111
aerosols 67
afferent nerves 105
agape 128, 135
alleles 104, 115
amino acids 92-94
  sequencing 105-106, 110
ammonia 90, 92
anisotropy 48
Annual Review of Astronomy and Astrophysics 86
anthocyanins (ACNs) 89
anthropic principle 3-5
  Davis on 71
  Susskind on 50
antibodies 128-129
antimatter 45
apoptosis 109
Aquinas, Thomas 122
Aristotle 3
Arkani-Hamed, Nima 4
asphalt problem 95
atheism 17
  and Darwin 114
  and Kenyon 92
atmospheric nitrogen 90
atomic weight 81
atoms 31-32
  and water 81
  primeval 41
Augustine 21, 122, 125
autonomic nervous system (ANS) 146
awareness 142, 146
axon 132-134

B

Bacon, Roger 14
Balbus, Steven 58
Bapteste, Eric 121
Bates, Elizabeth 142
B-cells 129
Benner, Steven 95
Bernhardt, Harold 97
beryllium 85
beta decay 38
Big Bang 41-42
  and evolution 122-123
  and multiverse 72
  linguistic 142
  opposition 43-45
Big Bang Theory 2, 14
big whack 68
biological amplification 123
Birney, Ewan 108
blood clotting 130
Blue Gene 107
Bohr, Niels 148
Bonaparte, Napoleon 12
Bondi, Hermann 2
Boscovich, Roger 14
bosons 32
brain 131-133
  and consciousness 137-138
  and synaptogenesis 134

breastfeeding 128
Brown, Arthur 64
Bryson, Bill 109

C

Calvin, Melvin 15
Cambrian explosion 119-120
Camus, Albert 1
capillary action 82
carbon 84-86
  and photosynthesis 87-89
carbon dioxide 67, 87-88
cardiovascular system 130
Carey, Nessa 108
Carnoy, Jean-Baptiste 14
Carr, Bernard 79
Carroll, Lewis 126
Carter, Brandon 3
cause 43
cell membrane 110
cells 109-111
  B-cells 129
  diploid 127
  glial 132, 134
  haploid 127
  red blood 130
  T-cells 129
  white blood 130
Chalmers, David 137
chaperones 106
Chesterton, G.K. 59
chirality problem 94
chlorophyll 88-89
chloroplasts 87
circumstellar habitable zone (CHZ) 61
Cleaver, Gerald 79
Clinton, Bill 103
codon 104-106
Collins, Francis 16
Collins, Robin 35
colostrum 128
Comet Shoemaker-Levy 9
Commentary on Genesis 122
communication 128, 143
compartmentalization 98
compatibilism 148
comprehensive philosophy 17
condensation 82
cones 131
consciousness 140-141
convection currents 65
convective zone 56
Copernican Principle 2-3
Copernicus, Nicolaus 2
Coriolis force 63
corotation circle 54
cosmic microwave background (CMB) 44-47
cosmological constant 41
  geography of 48-50
cosmological dark ages 46
Covalent bonds 84
Craig, William 33, 43
creatio ex nihilo 41
Cremonini, Cesare 3
Crick, Francis 18, 91, 95
cytokines 129
cytoplasm 105, 110
cytosine (c) 104
cytoskeleton 110

D

Darwin, Charles 113
Darwin's finches 119
Darwinism 113, 122
Davies, Paul
  on electromagnetism 36, 38
  on geography of universe 49
  on information 14, 99
  on multiverse 71
  on the Big Bang 42

Dawkins, Richard 79, 113
de Duve, Christian 92
deduction 6-7
Dembski, William 24, 109
dendrites 132, 134
Dennett, Daniel 140
Descartes, Rene 137
determinism 144
  and free will 148
  chemical determinism 117
  strict 145
deuterium 38, 46
Dingle, Herbert 24
Dirac, Paul 21
Divine creation 92
DNA 103-105, 116-117
doppler effect 42
double helix ladder 104
Dyson, Freeman 5
E. coli 118
Einstein, Albert
  on purposeful universe 5
  on science and God 14
  on laws of mathematics 24
  on modern quantum theory 148
electromagnetic force 36-38
electromagnetism 36, 38
electron 31-32
elements 31, 37
elliptical galaxy 52
Ellis, George 77
ENCODE (Enclyclopedia of DNA Elements) 108-109
endoplasmic reticulum 110
energy 37, 48, 99
  dark 41, 49
  fusion 51
  Hoyle 86
  renewable 58
entropy 43, 47-48
enzymes 97, 118
evolution 113, 115
  theistic (TE) 121
exponential numbers 25

F

fermions 32
Feynman, Richard 7
Fibonacci cascade 28
Fibonacci sequence 27-29
Fibonacci, Leonardo 27
fibrin 130-131
fibrinogen 131
Final Anthropic Principle (FAP) 5
fitness 114
fixation 90, 115
Flew, Anthony 111
Ford, Henry 13
free radicals 89
free will 144-147
  and compbatibilist option 148
functional magnetic resonance (fMRI) 139

G

galactic habitable zone (GHZ) 53
Galilei, Galileo 2, 21
gamma rays 36, 56
Garay, A. 94
gauge bosons 32
general theory of relativity 22, 41, 73
genes 104, 115
  junk 109
  hox 126
genome 103-105
Gingerich, Own 14
Gitt, Werner 100
glial cells 132
gluons 33, 37
God Particle 33-34

Godel, Kurt 77
God-of-the-gaps argument 12
golden spiral 27-28
golgi 110
Gonzalez, Guillermo 53
geocentric model 2-3
Gould, Stephen J. 13, 119
grand tack 69
gravity 35-36
  and Jupiter 69
  and stars 51-52
  and the Big Bang 41-42
  pressure 63
Greenstein, George 86
Gribbin, John 9, 85
Griffiths, Robert 17
Grossman, Lisa 83
guanine (G) 104

H

Hamilton, W.D. 127
haploid cell 127
Hartsfield, Tom 78
Hawking, Stephen
  on cause 43
  on free will 145
  on fundamental forces 34
Heile, Frank 76
heliocentric model 2-3
helper T-cells 129
Henderson, Lawrence 81
Higgs boson 32-34
Higgs field 32-33
Higgs, Peter 32
Hilbert space 72
histone 104
Hox genes 126
Hoyle, Fred
  and Big Bang 44
  on carbon 85-86
  on DNA/RNA 95, 111
  on evolutionary claims 113
Hsp90 (heat shock protein 90) 120
Hubble, Edwin 42
Human Genome Project (HGP) 103-104, 108-109
hydrogen
  and human body 81-82
  and oxygen 83-84, 88
  and stars 51
  and sun 55
  helium/ 63
hydrologic cycle 82

I

immune system 128-129
induction 7
Infeld, Leopold 148
information 99-101
  and mind 139
  and necessity 115-117
Innanen, Kimmo 70
innate immune system 128-129
intelligent design 100, 116
International Journal of Cardiology 28
iron 52
  and cardiovascular system 130
  core 63, 68
irregular galaxy 52
isotopes 31, 37

J

Jastrow, Robert 8, 42, 44
Jesuits 3
Johnson, Phillip 119
Jupiter 68-70

K

Kalam argument 43

kenosis 123
Kenyon, Dean 91
Kepler, Johann 2
Kingsley, Charles 122
Koonin, Eugene 95

L

Lagrange, Joseph-Louis 12
language 137-138
  and conscious mind 142-143
Laplace, Pierre Simon 12-13
Large Hadron Collider (LHC) 33, 76
Laughlin, Robert 113
Lemaitre, Georges 14, 42
Lennox, John
  and abstract information 100
  and Ford example 13
  on abstract law and personal agency 75
  on God 34
lenticels 88
Leonard Award 9
lepton 32
Leslie, John 4
Level I 72-73
Level II 72-73
Level III 72-73
Level IV 73
Lewis, C.S. 59, 141
Lewontin, Richard 11
Libet, Benjamin 146
light year 53
Lightman, Alan 72
lightning 90, 93
Linde, Andrei 4
Lipton, Peter 7
lithosphere 64-65
Livio, Mario 26
luminosity 56-57
Lund University 119
lymphocytes 129
lysosomes 110

M

macroevolution 113
  and Cambrian explosion 119
  and time 117
macrophages 129
Maddox, John 43
magnetic field 63-64
magnetic shield 63-64, 76
Magnus, Albertus 15, 124
Manson, Neil 79
materialism 9, 91, 137
  and free will 144
  and naturalism 16-17
  Lewontin on 11
  methodological 17
  ontological 17, 44
  Penrose on 48
materialist science 91
mathematics 21-24
  of M theory 76
Mathematics of Evolution 113
Mayr, Ernst 121
McGilchrist, Iain 146
McGrath, Allister 111
McIntosh, Andrew 98
McLean, Euan 34
mediocrity principal 1
meiosis 127-128
Mendel, Gregor 14
Mercury 62
messenger RNA (mRNA) 100, 105
metabolism-first hypothesis 98-99
Meyer, Stephen 116
microevolution 113,117, 120
Milky Way 51-54
Miller, Kenneth 123
Miller, Stanley 92
Miller-Urey experiment 92, 101

Millikan, Robert 3
misanthropic principle 1
mitochondria 111
mitosis 127-128
Mlodinow, Leonard 34
modal realism 73
monomers 93-94
moon 67-70
Mount Pinatubo 67
mountains 63, 65
M-theory 73
Muller, Gerd 117
multiverse 71-73
  and panspermia 95
  exists 78-79
Murray O'Hair, Madalyn 17
myelin 132
myelination 134

N

National Academy of Sciences (NAS) 119
National Aeronautics and Space Administration (NASA) 47
natural laws 16, 117
natural selection 113-114, 141
  and genetic mutations 118
  and necessity 115
naturalism 16-17
nebular cloud 55
necessity 115
neural plate 132
neuron 132-134
neurotransmitters 133
neutron 31-33
  and weak and strong forces 37-38
Nicolelis, Miguel 134
Nilsson, Nils 119
NIODA 6, 123
nitrates 90
nitrogen 89-90
NOMA (non-overlapping magisteria) 13
nuclear pore complex 105
nucleus 37-38, 110
Nuland, Sherwin 130
null hypothesis 7, 24

O

occipital lobe 131
optic nerve 131
orbital eccentricity 62
Orgel, Leslie 95
origin of life (OoL) 91-93, 99, 101
Orion Arm 54
oscilloscope 146
oxygen
  and cardiovascular system 130
  and photosynthesis 87-89
  as molecule of life 81-84
  atmosphere 92-93
ozone 64
ozone layer 64, 93

P

Page, Don 23
Pagels, Heinz 5
panspermia 95-96
participatory anthropic principle (PAP) 6
Penrose, Roger
  on brains and cosmos 132
  on mathematics 21, 26
  on multiverse notions 77
  on phase-space 47
Penzias, Arno 44
period of heavy bombardment 69
Perseus 54
phase-space 47

phenotype 114-115
phosphorus 51, 66
photoreceptors 131
photosynthesis
  and carbon-oxygen cycle 87-89
  and volcanos 66-67
Planck, Max 16, 18
planetesimals 83
Planinic, Josip 4
plasma 55, 130
plasma atmosphere 64
plasmin 131
plasminogen 131
plate tectonics 64-66
platelets 130
Politzer, Georges 43
Polkinghorne, John 123, 141
polymerization 93
polymers 93, 96
polymorphic gene 104
postmodernism 77
Pratt, Wallace 66
probability
  and free will 144
  and homochirlity 94-95
  boundary 25, 62
  limit of 24
  of Big Bang 47
Prost, Addy 99
proteins 93, 97
  folding 110
  making 104
Protestant Reformation 2
protons 31-32
proton-to-electron mass ratio 38
Ptolemy, Claudius 2
punctuated equilibrium theory 119

Q

quantum theory 33
quarks 32, 45
Quaternary stage 106
Quaternary Triplet Code 103
quartz 84
Quintus Tertullian 15

R

racemic 94
Radford, Tim 75
radiative zone 56, 63
radioisotopes 37
rationalism 6
reaction rates 92, 94
recombination era 45-46
red queen hypothesis 126-127
red-blood cells 130
Rees, Martin 37, 85
replication 95, 97
reproductive success 115, 141
resonance 85-86
respiration 88-89
ribosomal RNA (rRNA) 106
ribosomes 100, 110-111
ribozyme replicase 97
Ridley, Mark 127
Riemann, Bernhard 21
RNA 93
  RNA polymerase (RNAP) 105
  RNA-first hypothesis 97
  world hypothesis 96-98
rods 49
Ross, Hugh
  on exponential numbers 25
  on just-right tides 58
  on planet chances 9
  on solar system 53
Russell, Colin 11
Russell, Robert 14, 123

S

Sagan, Carl 61, 84
Sagittarius A* 53
Sandage, Allan 16, 44, 135
Saturn 62, 69
Schrodinger, Erwin 101
Scientific Dissent from Darwinism 113
secondary structure 106
Shalev, Baruch 17
Shostak, Seth 75
silicon 84
Silva, Ignacio 123
single-nucleotide polymorphism (SNP) 104
Sinha, S. 27
Sir Arthur Eddington 18, 22
Sir Isaac Newton 15
Sir James Jeans 18
Sir John Eccles 139
Smalley, Richard 78
soft determinism 145, 148
solar flares 63
speciation 119
Sperry, Roger 132
spin axis 68
spiral arms 53-54
spiral galaxy 52, 54
Spradley, Joseph 68
stagnant lid 65-66
standard model 31-32
Stark, Rodney 16
stars 51-52
  and gravity 35
  and strong and weak forces 37-38
  formation of 46
  in Orion Arm 54
  luminosity 56-57
stellar nucleosynthesis 46, 51, 85, 87
Steno, Nicolas 14
Stevens, John 131
stomata 87-88
Strauss, Michael 34
strict determinism 145
strings 74, 76
strong anthropic principle (SAP) 5
strong force 37
subduction 64
Sun 55-58
  and Earth's circling 63
  as metaphor for God 59
supernova 38, 46, 52
suppressor T-cells 129
Susskind, Leonard 50
Swindell, Rick 89
synapses 133-134
synaptogenesis 134

T

Taylor, Stuart 9
T-cells 129
Tegmark, Max 72
tertiary stage 106
tetrahedron 82
The Astonishing Hypothesis 18
The Fibonacci Quarterly 27
The Golden Ratio 25-26
  and Fibonacci sequence 27-29
The Grand Design 74
The Intelligent Universe 96
The Myth of Sisyphus 1
The Origin of Species 113
The Supernova Cosmology Project 49
theism 17
theories 7, 75-76
thermodynamics 47, 94
Thomson, Joseph J. 31
Through the Looking Glass 126
thymine (T) 104

tidal locking 62, 69
tides 58-59
Tipler, Frank 5
transcription 105
transfer RNA (tRNA) 105
transitional forms 119
translation 95, 105-106
Treatise on Celestial Mechanics 12
triple alpha process 85

U

uncertainty principle 6
University of Bologna 15
University of California, Davis 57
uracil 105
Urey, Harold 92
UV radiation 64

V

vacuoles 110
valence electrons 84
Venus 63
vibration 85
virtual photons 36
Voyager 1 61

W

W boson 38
Wahlberg, Mats 122
Wald, George 92
Walker, Sara 99
water 81-84
  and RNA 96
  mass 63
Watson, Bruce 93
weak anthropic principle (WAP) 4
weak nuclear force 34, 38
Weber, Max 144
Wei-Haas, Maya 67
Weinberg, Steven 50, 79
Wheeler, John 3, 6
Wickramasinghe, Chandra 95-96
Wigner, Eugene 28, 140
Wilkinson Microwave Anisotropy Probe 48
Williams, George 115
Williams, Mark 83
wind 58, 68
Woit, Peter 77
Wood, Bernard 113

Y

Yockey, Hubert 100, 116

Z

Z boson 38
Zalasiewicz, Jan 83
zygote 126-128