Index

Abductive reasoning, 151
Accidents, 89
Acorns, 104
Adaptation, 28–34, 71–85
and construction, 77–85
convergence of, 50
cumulative nature of, 29
lock and key metaphor of, 81
random search vs. selection, 32
selection type theories of, 28–35
Adaptationism, 39–50, 63–65
vs. artifact model, 44–50, 67
vs. evolutionary skepticism, 64
heuristic, 39–40, 76
hypothetical, 39–40
Adaptive convergence.
See Adaptation
Adaptive thinking, 40, 58–63
and naive fitness account, 112
weak, 59
Airfoils, 158
Allen, C., 15, 115
Altar, rock, 112
Altruism, 16
Amundson, R., 68, 139
Animism, 8
Antibody, 122
Ants, 15
Cataglyphis, 59
Archetypal organism.
See Organism
Artifact model, 2, 39–42
vs. adaptationism, 44–50, 67
vs. developmentalism, 67–71
failings of, 47
Artifacts
blueprints for, 153
copying of, 141
design history and tradition of,
51, 53
developmental programs of, 159
fitness, 140–144
functions of, 88 (see also Function)
intention in evolution of, 49, 98,
160–161
vs. junk, 158
mass-produced, 142
parent of, 141
parts as analogous to traits, 49
structure of, 51
Artisans, 76
“As-if” functions. See Function
Ayala, F., 30
Baker, B., 53
Baptism of Christ, interpretation
of, 53
Barkow, J., 60
Baseball caps, 157
Baxandall, M., 53
Behavioral ecology, 15
Bekoff, M., 15, 115
Beliefs, 96
Bell, C., 12
Bibles, 89
Bigelow, J., 6, 102
178 Index

Biological purpose. See Function
Blinking, 47
Blood, 87
Boeing 747s, 21, 75
Boorse, C., 97
Brainworm, 82
Brazil nuts, 128
Bridgewater Treatises, 12
Buller, D., 97

Cain, J., 34
Cairns-Smith, A. G., 121
Camouflage, 69, 92
Cancer, 43
Carlson, W. B., 161
Cars, 60, 142
Catalysts, 128
Causal role (CR) account. See Function
Causation, 101
Causes, stochastic, 48
Chance, 21, 165
Charlesworth, B., 28, 49
Chasing, 8
Cheat detection module, 63
Cheetahs, 126
Chemistry, 119
surface, 128
Choice, 109
Clay crystals, 121, 123
Clouds, 8
Clutch size, 55
Coin-tossing, 24
Complex specified information (CSI), 163
Composition, musical, 154
Computer operating systems, 142
Conceptual analysis, 5, 9, 15
Constraints, 83. See also Problems on ancestral population, 69
and internalism, 77–79
on solutions for organisms, 45, 47
(see also Solutions)
Construction and adaptation, 77–85, 140
causal vs. logical, 80

of niche, 67, 81–85, 140–141
relation between organism and environment, 80
Constructivism, 67, 80–81
Continuity, 35
Contrastive explanation. See Explanation
Cosmides, L., 60
Counterfactuals, 100, 146, 147
Cow pats, 145
Creationism, 162–165.
See also Natural theology
Creative genius, 159
Creativity, 161
Creed, E., 54
Crow, J. F., 126
Crypsis, 54
Cultural reproduction, 148.
See also Artifact
Curtains, 88

Darden, L., 34
Darwin, C., 21, 29, 57
Davidson, D., 12
Davies, P. S., 60, 100
Dawkins, R., 12, 58, 134
Dembski, W., 162
Dennett, D., 40, 42, 64
Derham, W., 21
Design, 13
of artifacts, 51 (see also Artifacts)
conscious, 14
and function, 115, 136–138
as heuristic, 126
intelligent (see Creationism)
intentional, 49
as metaphor, 11
projection of onto trait, 137
and selected effects account of function, 92
tradition, 51
See also Structuralism
vs. artifact model, 71
Developmental organization, 36–37, 123
Developmental systems theory, 145
Diamond, structure of, 75
Dimetrodon, 106
DNA
as replicator, 145
selfish, 14, 122, 125
Doolittle, W., 13, 125
Drift, 22, 64
and artifact model, 48
and functions, 95
as product vs. process, 24
Drug companies, 127
Drug discovery, 29

Earwig, penis of, 1
Ecology, importation of metaphors from, 140
Economics, 140
Edison, T., 161
Elephants, 146
Engineering explanations.
See Explanation
Environment. See also Problems ancestral, 62
collection to trait fitness, 103
niche construction, 67, 81–85, 140
niche vs. environment of adaptation, 84
savannah, 81
time slice of, 106
Epigenetic inheritance systems (EIs), 146
Ethology, 15
Etiological account of function.
See Function
Evolution, Lamarckian, 151–154
Evolutionary epistemology, 139
Evolutionary explanation.
See Explanation
Evolutionary game theory, 58, 81
Evolutionary psychology, 60
Evolutionary skepticism, 64
Exaptation, 116–117
Explanation
chance as, 21
contrastive, 79
engineering, 49
evolutionary, 139, 154–160
functional (see Function)
innovation to the best, 51
interest-relativity of, 68
in naive fitness account, 112
probabilistic, 26
Extended phenotype, 58, 82
Externalism, 67–71, 77
Eyes, 72

Finch beaks, 21
Fisher, R. A., 23
Fitness, 23, 26
of artifact traits, 140
(see also Artifacts)
environmental contribution to, 103
(see also Solutions)
heritable contributions to, 95
inclusive, 143
landscapes, 35
trait contribution to, 101
Foraging behavior, 56
Forth Bridge, 53
Francesca, Piero della, 53
Frequency-dependent selection.
See Selection
Freudianism, 157
Function, 4, 50, 87–117, 119–139
vs. accident, 89, 129–130
causal role (CR) account of, 87–91
and design, 115, 136–138
etiological account of, 90, 111
explanatory role of, 88–96,
97–102, 111–112
genuine vs. as-if, 128–129
intended effects (IE) account of, 89–90
malfunction, 88, 90, 103, 107
as metaphor, 11, 13
modern history view of, 114
multiple, 132–134, 158
naive fitness (NF) account of, 102, 111–115
naturalized account of, 11
Index

Function (cont.)
nonhistorical account of, 102–108
as normative, 88, 96–97
selected effects (SE) account of, 4, 90–96, 99–102, 119
specialization of, 136
teleological sense of, 91
weak theory (WT) of, 97–102, 109

Gait, mammalian, 55
Galls, plant, 82
General Electric, 42
Genes
function of, 133
parts as having function, 126
as replicators, 145
segregation distorter, 122, 125–126
Genetic plans, 31
Genetics
population, 155
transmission, 156
Germ line, 152
Ghiselin, M., 41
Giesel, J. T., 28, 49
Giraffes, 152
Glacial erosion, 59
God, 135
Godfrey-Smith, P., 39, 68, 77, 82
Goodwin, B., 17, 71, 71–77
Gould, S. J., 65, 70, 116, 124
Gradualism, 71–77, 116
Gravity, 23
Griffiths, P., 40, 50, 54, 119

Hearts, 88–91
Helipads, 51
Heritability, 23
Heterozygote superiority, 156
High-throughput screening.
See Sorting process
Ho, M.-W., 67, 75
Homology. See Traits
Hospital diagnosis, 87

Hull, D., 5, 144
Humanities, 158
Hume, D., 163
Immune system, 121
Inference to the best explanation.
See Explanation
Insect wings, 14
Instant lions, 105
Intelligent design creationism.
See Creationism
Intended effects (IE) account.
See Function
Intentional design. See Design
Intentional selection. See Selection
Interactors, 144. See also Selection
Internalism, 67–71, 77, 78
Internal structures, 36
Intragenomic selection.
See Natural selection
Intuition, 6
killer, 108–112
Ions, 128–129
Jablonska, E., 155
Jackknife, 13
Jam jars, 89
Just-so stories, 65
Kauffman, S., 35, 72
Kettlewell, H. B. R., 54, 78
Kidneys, 89, 105, 107
Killer intuition, 108
Kimura, M., 95
Kitcher, P., 6, 84, 115
Knowledge, 161
Koehl, M., 14
Krebs, J., 57, 60
Lamarck, 151–154
Lauder, G. V., 41
Laws of form, 75
Lewontin, R., 35, 65, 67, 70, 77, 80, 124, 143
Lipton, P., 79
Lock and key. See Adaptation
Longshore drift, 92, 128

Machine guns, 39
Majerus, M. E. N., 55
Malfunction. See Function
Manning, R. N., 122, 125
Marketing, 140
Marxism, 157
Mass-production. See Artifacts
Matthen, M., 122
Maynard Smith, J., 57
Mayr, E., 23, 41, 44, 82
McKitrick, M., 83
McLaughlin, P., 90, 108, 110
Meaning
of scientific terms, 6, 10
stipulation of, 7
Meiosis, 122, 125
Melanism. See Moth
Memetics, 139
Mendel’s laws, 156
Mental states, 148
Metaphor, 8–16
“altruism” used as, 16
dead, 13
“design” used as, 11, 13
“function” used as, 11, 13
importation from ecology to other
disciplines, 140
“purpose” used as, 13
vs. technical meaning, 10, 11
Meteorology, 9–10
Methylation patterns, 146
Mice, 105
Microsoft Windows, 150
Millikan, R. G., 8, 96, 100
Mosquitoes, 22
Mother Nature, 40
Moths, 78
peppered, 54
melanism of, 54
Mouths, 21
Music, 154
Mutation, directed vs. random,
152–154
Naive fitness (NF) account.
See Function
Natural selection, 22
as creative, 30
eyearly in development vs. late, 70
“for” vs. “of,” 91
force of vs. selective forces,
22, 26–28
general theories of, 34
at individual vs. population level, 25
vs. intentional selection, 97, 109
intragenomic, 125
power of, 70
pressure of, 30
as product vs. process, 23–24
sexual, 58
as shaper of form, 76
(see also Shaping)
as a theory of forces, 22–26, 79
Natural theology, 12, 21, 41, 134–136
Neander, K., 31, 99, 105
Neutral theory of evolution, 95
(see also Drift)
Niche. See Environment
Nissen, L., 12
Norms, functions and, 97
Optimality model, 40–41, 50–58
Organism, archetypal, 49
Orgel’s Second Law, 58
Orzack, S., 39
Oster, G., 58
Ovulation, 61
Painting, 48, 53
Paley, W., 12, 21, 134
Panglossianism, 40–41, 65
Papineau, D., 96
Paramecium, 146
Partridge, R., 6, 102
Parker, G. A., 57
Peacocks, 113
Penis, earwig’s, 1
Peppered moths. See Moths
Pesticide resistance, 22
Physics, 119
Index

Pinker, S., 41
Planck’s constant, 163
Pleiotropy. See Traits
Pleistocene, 1
Pluralism, 76, 91
Popular works, 13
Population genetics. See Genetics
Power, cultural evolution
and, 143–144
Power of selection.
See Natural selection
Problems
design (D-problems) vs. evolutionary
(E-problems), 130–132
environmental, 40, 44, 80, 81, 109
Process structuralism.
See Structuralism
Propensity account, 102
Purpose. See Function
Quasi-independence, 35
Raff, R., 133, 138
Raytheon, 42
Reeve, H., 70
Regulative principle, 43
Replicator, 144–151
gene as, 145
vs. interactor, 153
as trigger vs. template, 147
(see also Selection)
Reproductive success, 32
Resnik, D., 39
Reverse-engineering, 40–44, 112–127
as Kantian, 43
and naive fitness account, 112
of sorting process, 127
and trait history, 116
weak, 42
Rhinos, 157
Roller skates, 61
Ruse, M., 4
Sampling error, 23
Sapienza, C., 13, 125
Saunders, P. T., 67, 75
Savannah. See Environment
Screws, 6
Segregation distorter genes. See Gene
Selected effects (SE) account of
function. See Function
Selection. See also Natural selection
frequency-dependent, 142
replicators vs. interactors, 144–151
technological change as, 139–157
units of, 144
vicarious, 159
Selection pressure.
See Natural selection
Selective forces. See Natural selection
Selective problems. See Problems
Selfish DNA. See DNA
Seth, V., 163
Sexual selection. See Natural selection
Shaping, 36, 48, 71, 76, 116, 137.
See also Natural selection
Shell fish, 12
Sherman, P., 70
Smith, K., 72
Smoking, 147
Smolin, L., 163
Sober, Elliott, 5, 23, 39, 69, 71, 91,
109, 116, 156
Solutions
constraints on, 45
of organism, 40, 44–45
trade-off between, 33, 47, 69, 124
Sorting process, 120–126
high-throughput screening, 126
technological change as, 140
Specialization. See Function
Stegosaurus, 1
Stephens, D. W., 57
Sterelny, K., 104
Stotting, 1
Structuralism, 67, 72–77
process, 72
Sunshine, 27
Swampman, 87, 96
Symons, D., 61, 111
Synchronic variation, 97.
See also Traits
<table>
<thead>
<tr>
<th>Term</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological change</td>
<td>151–154</td>
</tr>
<tr>
<td>as Lamarckian</td>
<td>151–154</td>
</tr>
<tr>
<td>reproduction in</td>
<td>156</td>
</tr>
<tr>
<td>as selection process</td>
<td>139–157</td>
</tr>
<tr>
<td>Teleology</td>
<td>4–8, 123</td>
</tr>
<tr>
<td>absence of in chemistry and physics</td>
<td>119</td>
</tr>
<tr>
<td>as-if</td>
<td>120</td>
</tr>
<tr>
<td>and continuity</td>
<td>134</td>
</tr>
<tr>
<td>and function</td>
<td>91</td>
</tr>
<tr>
<td>Teleosemantics</td>
<td>96–97</td>
</tr>
<tr>
<td>Thompson, D. W.</td>
<td>77</td>
</tr>
<tr>
<td>Thompson’s gazelle</td>
<td>1</td>
</tr>
<tr>
<td>Tinbergen, N.</td>
<td>15</td>
</tr>
<tr>
<td>four whys</td>
<td>113</td>
</tr>
<tr>
<td>Tooby, J.</td>
<td>60</td>
</tr>
<tr>
<td>Tool use</td>
<td>141</td>
</tr>
<tr>
<td>Toxins, plant</td>
<td>62</td>
</tr>
<tr>
<td>Trade-off</td>
<td></td>
</tr>
<tr>
<td>Traits</td>
<td></td>
</tr>
<tr>
<td>See also Shaping; Drift</td>
<td></td>
</tr>
<tr>
<td>acquired</td>
<td>152</td>
</tr>
<tr>
<td>contribution to fitness</td>
<td>101</td>
</tr>
<tr>
<td>developmental relations between</td>
<td>49</td>
</tr>
<tr>
<td>emergence of</td>
<td>94</td>
</tr>
<tr>
<td>homology</td>
<td>51, 99, 104</td>
</tr>
<tr>
<td>independence of</td>
<td>49</td>
</tr>
<tr>
<td>pleiotropy</td>
<td>99</td>
</tr>
<tr>
<td>variation</td>
<td>69, 92, 97</td>
</tr>
<tr>
<td>vestigial</td>
<td>114</td>
</tr>
<tr>
<td>Transmission genetics</td>
<td></td>
</tr>
<tr>
<td>See Genetics</td>
<td></td>
</tr>
<tr>
<td>Tumors</td>
<td>44</td>
</tr>
<tr>
<td>Underdetermination</td>
<td>58</td>
</tr>
<tr>
<td>Units of selection</td>
<td></td>
</tr>
<tr>
<td>See Selection</td>
<td></td>
</tr>
<tr>
<td>Universal Darwinism</td>
<td>34–37</td>
</tr>
<tr>
<td>Variation</td>
<td></td>
</tr>
<tr>
<td>See Traits</td>
<td></td>
</tr>
<tr>
<td>Vicarious selectors</td>
<td>159</td>
</tr>
<tr>
<td>Vincenti, W. G.</td>
<td>159</td>
</tr>
<tr>
<td>Visual system, of bird</td>
<td>55</td>
</tr>
<tr>
<td>Vrba, E.</td>
<td>116</td>
</tr>
<tr>
<td>Wake, D.</td>
<td>17</td>
</tr>
<tr>
<td>Walsh, D.</td>
<td>24–25</td>
</tr>
<tr>
<td>Weak theory (WT)</td>
<td></td>
</tr>
<tr>
<td>See Function</td>
<td></td>
</tr>
<tr>
<td>Wehner, R.</td>
<td>59</td>
</tr>
</tbody>
</table>