

Cambridge University Press

0521771870 - The Concept of the Gene in Development and Evolution: Historical and Epistemological Perspectives

Edited by Peter J. Beurton, Raphael Falk and Hans-Jörg Rheinberger

Index

[More information](#)

## Index

- Adoutte, A., 207, 208, 209
- Alberts, B., 9, 13, 15, 24
- Allen, G. E., 91, 112, 194, 208, 321, 345
- Apter, M. J., 162, 163, 164, 165, 170, 176
- Aristotle, 80
- Artificial Life, 170–71
- artificial selection, 71, 85
- Atkins, J. F., 12, 24, 230, 237
- Atlan, H., 163, 176, 235, 237
- atomism
  - atomicity, 181
  - genes as atomic edifices, 119, 132, 135
  - genes as atoms, 178, 261, 307, 317, 321–23, 326, 335, 341
- Austin, J. L., 235
- autocatalysis, 227, 256, 288, 339
  - autocatalytic chemical cycles, 251, 279
  - autocatalytic proteins, 226
  - autocatalytic splicing, 229–30
  - autocatalytic structures, 82
    - a property of genes, 230, 287
- automata theory, 163–64, 170
- Averof, M., 180, 188, 204, 208
- Avery, O. T., 227, 237, 288, 312
- Ayala, F. J., 116, 153
- Bachelard, G., 222, 237
- Baltimore, D., 24, 185, 191
- Barrell, B. G., 293, 312
- Bateson, W., 28, 31, 266, 267
  - presence-absence theory of the gene, 31, 266
- Beadle, G. W., 30, 38, 116, 194, 226, 237, 288, 312, 324, 329, 332, 345
- Belling, J., 104, 112
- Benzer, S., 115–17, 122–54, 222, 292, 294, 312, 327, 328, 338, 339, 345
- Berg, P., 152, 155, 295, 313
- Berge, S., 71, 88
- Bernard, C., 219, 237
- Bernstein, S. I., 7, 24
- Beurton, P. J., 40, 81, 88, 116, 208, 335, 336, 338, 340, 344
- biometry, 73–75, 249
  - biometric analysis, 320
  - Mendelism, 75–77
- biophores, 262, 320
- black box
  - in development, 253, 272
  - in heredity, 253, 272
- Blake, C. C. F., 300, 312
- blueprint, 161, 172, 235
  - see also* one-to-one relations
- Bohr, N., 139
- Bonner, D. M., 134, 154
- Bonner, J., 117, 164–70, 172, 176
- bottom-up approach, 45
  - see also* downward causation, top-down analysis
- boundary objects, 220–23, 225
- Bowler, P. J., 180, 189
- Brandon, R., 241, 255, 279, 282
- Brenner, S., 140, 172, 176, 196, 199, 209, 334, 345
- Bridges, C. B., 39, 90, 195, 209, 284
- Britten, R. J., 184, 189, 293, 312, 329, 345
- Brosius, J., 232, 237, 300, 312
- Brown, M., 44, 65
- Brown, W. L., 302, 312
- Brûlet, P., 203, 208, 212
- Burian, R. M., 40, 42, 49, 55, 65, 81, 82, 88, 89, 91, 112, 184, 189, 194, 205, 209, 237, 279, 282
- Burns, G. W., 150, 151, 154
- Buss, L., 258, 278, 282
- Cairns, J., 79, 89, 328, 345
- Calkhoven, C. F., 11, 12, 24
- Callaerts, P., 205, 211, 347
- Calvin, M., 102, 112
- Cambrian explosion, 193, 206–07
- Campbell, D. T., 301, 312

*Index*

- Carlson, E. A., 6, 24, 91, 92, 112, 117, 120, 135, 154, 237, 294, 295, 296, 312  
 Carrasco, A. E., 200, 209, 214  
 Carroll, S., 180, 192, 214  
 Carroll, S. B., 186, 189, 204, 209  
 Cartwright, N., 280, 282  
 Caspari, E., 30, 334, 345  
 Castle, W. E., 28, 268, 321, 324, 346  
 cell lineage, 186  
 central dogma of molecular biology, 228, 233, 264, 305, 329, 341, 343  
 Champe, S. P., 146, 147, 154  
 Chargaff, E., 227, 239  
 Chase, M., 121, 122, 154  
 Chovnick, A., 150, 154  
 chromosome, 98–101, 104–08, 141  
     banding patterns, 20, 104  
     breaks, rearrangements, 99, 100–01, 106, 197  
     chromosomal fields of action, 108–09  
     chromosomal theory of inheritance, 78  
     Goldschmidt's view of, 91–92, 95, 97  
     sex chromosomes, 343  
     structure, 173  
 Churchill, F. B., 282, 321, 344, 346  
 circular causality, 169  
 circularity, 238  
     of argument, 242, 302  
     of developmental process, 174  
 cis-trans test, 115, 131, 137, 138, 143  
 cistron, 57, 138, 143–44, 146, 150, 153, 222, 292, 327–29  
 clever genome, 296, 305  
 Cohen, J. S., 227, 239  
 compartmentalization, 332  
 compartmentation, 302, 311  
 Conklin, E., 263, 268, 282  
 conserved  
     developmental pathways, 180, 187, 200, 335  
 genes, 180–81, 187, 193, 198, 199–200, 201–02, 204–07  
     motif, 190  
 Cooper, A. A., 230, 237  
 Correns, C., 334  
 Coveney, P., 236, 237  
 Cowan, R. S., 74, 89  
 Crick, F. H. C., 3, 80, 90, 128, 140, 154, 198, 209, 227, 233, 237, 264, 286, 288, 306, 312, 313, 321, 326, 327, 329, 332, 338, 345, 346, 348  
 Culp, S., 36, 38  
 cytoplasm  
     controlling the activity of genes, 197  
     and epigenetic inheritance, 251  
     part of the instruction producing system, 13, 163, 170  
 Czech, M. P., 190  
 Darden, L., 276, 282  
 Darnell, J., 24  
 Darwin, C., 71, 72, 86, 88, 89, 262  
*Dauermodifikationen*, 251  
 David, B., 85, 89  
 Davidson, E. H., 184, 189, 329, 345  
 Davis, R. L., 185, 188, 189, 192  
 Dawkins, R., 45, 65, 242, 243, 245, 260, 263, 279, 280, 282, 290, 291, 309, 310, 312, 336, 346  
 de Chadarevian, S., 175, 176, 177  
 Delbrück, M., 123, 124, 126, 132, 133, 134, 136, 138, 139, 140, 141, 153, 154, 226, 237, 239  
 Demerec, M., 94, 98, 99, 100, 106, 107, 112, 134, 135, 154  
 Democritus, 286  
 De Robertis, E. M., 180, 189, 200, 202, 203, 205, 209, 214  
 determinants, 262, 287, 321  
 determinism, 60, 232, 318  
     biological, 60  
     genetic, 47, 58–64, 318  
 development and cybernetics, 163, 169, 170  
 development, the paradox of, 162, 270–76, 332  
 developmental genes, 177, 181–82, 187–88, 192–208, 325, 333, 336, 340  
 developmental genetics versus population genetics, 178–92  
 developmental invariants, 257  
     genes as, 261, 264, 266, 269–76, 341  
 developmental pathway, 168, 181, 303–05  
     of genes, 180–81, 187, 201, 202, 208, 303  
 developmental program  
     location of, 166–69  
     *see also* program  
 de Vries, H., 86, 88, 89, 262, 320  
 Dickison, M., 280, 281, 285  
 Dietrich, M. R., 96, 97, 111, 112, 119, 180, 275, 278, 325, 334  
 DNA double helix, 3, 123, 132–33, 140, 224, 227, 288, 356  
     discovery of, 123–24, 227  
     information and form, 80  
     three-dimensional structure of, 80  
 Dobzhansky, T., 92, 97, 98, 102, 112, 178, 179, 180, 182, 189, 195, 209, 289, 307, 312  
 Doermann, A. H., 121, 128, 130, 154  
 Dollé, P., 203, 210, 213  
 dominance, 84, 266  
     partial dominance, 268  
 dominant factors (traits), 267  
 Doolittle, R. F., 301, 312  
 Doolittle, W. F., 293, 312

*Index*

- Dorit, R. L., 301, 312
- Dove, W., 176, 209, 345
- downward causation, 301–02, 305–06, 307–10  
*see also* top-down analysis
- D’Souza, V. N., 7, 24
- Duboule, D., 180, 181, 189, 192, 203, 204, 210, 215
- Duhem, P., 69, 92, 112
- Dunn, L. C., 91, 93, 95, 96, 102, 112, 113, 223, 237
- Dyson, F., 252, 282
- East, E. M., 28, 321
- Eigen, M., 234, 235, 237
- Elkana, Y., 221, 238, 319, 346
- embryogenesis, 72, 195, 201, 262, 331
- Emerson, C. P., Jr., 185, 186, 189, 190, 191
- Emmeche, C., 170, 177
- Emmons, S., 183, 189
- empiricists, 5, 6, 343
- Ephrussi, B., 30, 38, 184, 189, 194, 332
- epigenetic, 331, 334, 342  
 milieus, 46, 59  
 versus genetic, 160
- epigenetic inheritance systems (EIS), 232, 249–51, 256
- epistemetic entity, 235, 343  
 epistemology of the imprecise, 224, 236, 342  
 objects, 219, 342  
 practices, 220, 225  
 vagueness of, 220, 235, 342  
*see also* fuzzy appearance, vague concepts
- euchromatin, 104, 106, 107
- experimental system, 147–50, 223–26, 230
- factors (genes), 28–31, 248, 262, 264–69, 322, 336, 341
- Falk, R., 24, 38, 39, 65, 154, 238, 282, 312, 346
- Feirtag, M., 34, 39
- Feldman, M., 45, 65
- Finkelstein, R., 200, 210
- Fischer, E. P., 229, 232, 238
- Fisher, R. A., 83, 84, 88, 89, 289, 290, 291, 308, 309, 312, 321, 346  
 Fisher’s cogency argument, 290–91, 308, 309
- Fleck, L., 147
- Fleischer, K., 171, 177
- Fogle, T., 4, 6, 23, 24, 49, 51, 65, 223, 278, 295, 297, 312, 327, 330, 331, 340, 343, 346
- Freese, E., 140, 154
- functional divergence among gene products, 9, 10, 13, 330
- fuzzy  
 appearance of the gene, 294–95, 342
- borders (boundaries), 7, 224
- concept (notion), 222
- terms, 342
- see also* epistemic entity, vague concepts
- Gale, J. S., 294, 312
- Galton, F., 71, 73, 74, 75, 89, 262, 317
- Gánti, T., 253, 280, 282
- García-Bellido, A., 198, 210, 332
- Gayon, J., 74, 87, 89, 184, 189, 194, 209, 320, 326, 327
- Gehring, W. J., 191, 198, 205, 209, 210, 211, 213, 214, 347
- gemmules, 72, 88, 262, 287, 320
- gene amplification, 232
- gene duplication, 196, 200, 203, 232, 293, 300
- genes  
 contextual determination of, 20, 175, 179, 182, 234, 300, 307  
 determinable/determinate properties of, 26–27  
 genes-in-pieces, 80, 294–95, 300
- genetic algorithm, 163, 170–71
- genetic code, 12, 13, 228–29, 253, 332  
*see also* program
- genetic marker, 30
- genetic material (versus genes), 48–49, 51, 64, 105, 231, 302, 306
- genetic recombination, 77, 327–28  
 in bacteriophage T4, 118–53  
 site specific, 38
- germ cells, 29, 88, 263, 267, 273
- germ plasm, 87, 98, 221, 363–64  
 separation of germ and soma, 260
- Gesteland, R. F., 12, 24, 230, 237
- Gifford, F., 41, 42, 46, 65, 179, 318, 322
- Gilbert, S. F., 36, 65, 91, 113, 179, 181, 182, 184, 187, 189, 190, 194, 197, 201, 204, 208, 209, 210, 211, 225, 261, 262, 265, 271, 276, 277, 282, 303, 311, 333, 335, 339, 340, 342
- Gilbert, W., 294, 301, 312
- Glennan, S., 241, 280, 283
- Goldschmidt, R., 33, 91–93, 95–100, 102, 104–13, 119, 179, 190, 194, 197, 211, 324, 325, 334, 345, 346  
 bridgeless gaps, 97  
 chromosome-as-a-whole hypothesis, 90–91
- Goldstein, J., 44, 65
- Gould, S. J., 197, 206, 211, 232, 237, 291, 313
- Gray, R., 279, 280, 281, 283
- Grene, M., 88
- Griesemer, J. R., 92, 114, 220, 235, 238, 239, 250, 252, 264, 279, 280, 281, 283, 334, 340, 341, 342, 345, 346
- Griffiths, P., 279, 280, 281, 283
- Gros, F., 223, 230, 231, 233, 238, 342

Cambridge University Press

0521771870 - The Concept of the Gene in Development and Evolution: Historical and Epistemological Perspectives

Edited by Peter J. Beurton, Raphael Falk and Hans-Jörg Rheinberger

Index

[More information](#)*Index*

- Gruss, P., 200, 203, 204, 210, 211, 212  
 Hajduk, S. L., 230, 237  
 Haldane, J. B. S., 182, 190, 334  
 Halder, G., 205, 211, 347  
 Hartl, D. L., 84, 89  
 Harwood, J., 30, 39, 110, 113, 194, 211, 324, 334, 346  
 He, X., 182, 190, 208, 211  
 heredity, 70–88, 162, 241, 249–54, 263–65, 271, 320, 333–34, 337–39  
 ancestral, 71, 74, 77  
 a force, 70–74, 82  
 a magnitude, 77–79, 83–85, 320  
 statistical law of, 74  
 statistical studies of, 73–75  
 heritability, 83–85, 242, 246–47, 249  
 broad sense, 84, 249  
 narrow sense, 45, 84, 249  
 Hershey, A. D., 120, 121, 122, 128, 130, 147, 154, 155  
 Herskowitz, I., 176, 209, 345  
 heterocatalysis, 227  
 entities, 230  
 potential of DNA, 288  
 potential of gene, 287  
 heterochromatin, 104, 106–07  
 Highfield, R., 236, 237  
 Hill, J. R., 10, 11, 24, 121  
 Hodges, D., 7, 24  
 holism (holist, holistic), 110, 270, 276, 281n22, 310, 331, 333  
 Holland, P., 203, 207, 211, 215  
 Holmes, F. L., 222, 292, 326, 328  
 Holthausen, C., 94, 95, 114  
 homeobox, 196, 200, 202  
 homeotic genes, 186, 188, 196–204  
 mutants, 104, 109  
 transformation, 203, 203–04, 207  
*Hox* gene, 180–81, 183, 187, 204  
*Hox* protein, 203  
 Hull, D., 242, 283  
 human genome project, 21  
 Hume, D., 32  
 Hutchinson III, C. A., 293, 312  
 Huxley, J., 182  
 hybridization, 265, 269, 271, 321  
 hybrids, 78, 248, 265–67, 341  
 hypercycle, 234  
 imprinting, 19  
 individuation  
   of genes, 51, 53–55, 57, 299, 302  
   of traits, 42–44, 46, 53, 299, 302–03  
 individuation criteria, 40–66, 322  
   of levels of development, 260  
 induction, 180  
 of developmental pathways, 168  
 information  
   and biological meaning, 234  
   also conditioned by cellular system, 13, 19–20  
   also conditioned by cytoplasm, 12  
   also conditioned by physiology, 15  
   and form, 79–80  
   and instruction, 165–66  
   cooperative orchestration of, 21  
   modification of, 146–47  
   origin of concept, 172, 228  
   varieties of, 81–82  
   *see also* program  
 informational gene, 294  
 inhibitor, 187  
   metabolic, 36  
 inside out genes, 7–8  
 instrumentalism, 48, 70  
   instrumentalist views of genetics, 81, 327, 321  
   instrumentalists, 325  
 integrons, 234, 342–43  
 intelligence  
   variation in, 42–43  
 interactors, 260  
 Jablonka, E., 233, 238, 250, 251, 253, 258, 278, 283, 345, 346  
 Jacob, F., 162, 172, 173, 174, 177, 187, 190, 196, 197, 208, 211, 212, 213, 223, 228, 229, 234, 235, 238, 273, 292, 306, 313, 328, 332, 333, 343, 346  
 Johannsen, W., 248, 263, 287, 304, 313, 320, 344, 346, 347  
 Johnson, W. E., 26, 27, 39  
 Judson, H. F., 79, 89, 116, 155  
 jumping genes, 231  
 Kaufman, T. C., 197, 214, 277, 284  
 Kavenoff, R., 328, 347  
 Kay, L., 164, 177, 222, 238  
 Keller, E. F., 88, 163, 164, 167, 177, 195, 198, 199, 212, 234, 238, 265, 283, 298, 313, 331, 332, 333  
 Kenyon, C., 186, 190, 191, 202, 203, 212  
 Kepler, J., 264  
 Kessel, M., 203, 204, 212  
 Kiger, J. A., 116, 153  
 Kimura, M., 297, 313  
 King, M.-C., 197, 212, 215  
 King, R. C., 150, 151, 155  
 Kitcher, P., 6, 24, 37, 39, 40, 49, 65, 224, 232, 235, 238  
 Kodani, M., 102, 112, 113  
 Kohne, D. E., 293, 312  
 Koltzoff, N. K., 104

*Index*

- Konieczny, S. F., 185, 190, 192  
 Koppel, M., 163, 176, 235, 237  
 Krumlauf, R., 203, 211, 213  
 Kühn, A., 227, 238, 334, 345  
 Kuhn, T. S., 271  
 Lallemand, Y., 203, 208, 212  
 Lamarckism, 72, 306, 345  
 Lamb, M. J., 233, 238, 250, 251, 253, 258, 283, 345, 346  
 Lassar, A. B., 185, 189, 190, 191, 192  
 Lawrence, P. A., 198, 209, 210, 213, 332, 346  
 Le Guyader, H., 205, 208, 209  
 lethals  
     induced and spontaneous, 100  
     recessive, 323  
 levels of organization  
     genomic, 19–20  
     of living beings, 70, 77, 253, 256  
 levels of selection, 301–02  
 Levine, M. S., 151, 200, 213, 342  
 Lewin, B., 8, 9, 13, 14, 24, 294, 313  
 Lewis effect, 123  
 Lewis, E. B., 117, 118, 119, 128, 129, 155, 188, 190, 195, 196, 198, 200, 212, 326, 332, 347  
 Lewis, J. H., 173, 177  
 Lewontin, R. C., 5, 48, 65, 161, 177, 180, 190, 242, 246, 248, 263, 283, 331, 337, 347  
 Lindee, M. S., 317, 347  
 linkage, 118, 100, 120, 134, 181  
     disequilibrium, 310  
     distance, 127, 130  
     groups, 121–22  
     map, 128, 322, 364  
 Lloyd, E. A., 256, 283  
 locus control region (LCR), 16–17, 23, 181  
 Lodish, H., 15, 24, 175, 177  
 long interspersed sequences (LINEs), 229  
 López, B. C., 85, 89  
 Luria, S. E., 120, 150, 155  
 Lush, J. L., 84, 90  
 Lwoff, A., 123, 235, 236, 238, 317  
 lysis, 120, 130  
     inhibition, 124–25  
 Mach, E., 75  
 Mackie, J. L., 32, 33, 34, 39, 42, 65, 322  
     Mackie's INUS condition, 32, 33, 322  
 MacLeod, C. M., 227, 237, 312  
 macroevolution, 97, 179, 180–81  
 macromutations, 197, 198, 334  
     *see also* mutations, systemic  
 Maienschein, J., 91, 113, 281, 283  
 many-to-many relations  
     between genes and traits, 26–27, 28, 30–31, 322  
     *see also* one-to-one relations  
     mapping of fine structure of genes, 115–55, 222, 269  
 Markert, C. L., 176, 177  
 Maroney, P. A., 17, 24  
 master gene, 184, 186, 193, 199, 201, 205, 207  
     master program, 168  
     master regulator, 186  
     “material overlap” in reproduction, 243–47, 252, 253, 259, 279  
 maternal effects, 161, 176n3, 268  
 Mather, K., 108, 109, 114  
 Matthaei, 223, 228, 238  
 Maull, N., 276, 282  
 Maynard Smith, J., 253, 264, 279, 281, 283, 284, 285, 301, 313  
 Mayr, E., 162, 176, 177, 182, 205, 214, 281, 284, 301, 313  
 McCarty, M., 227, 237, 312  
 McCauley, D., 252, 284, 285  
 McClintock, B., 117, 155, 293, 313, 332, 347  
 McGinnis, W., 200, 203, 204, 209, 210, 213, 214  
 measurement and heredity, 78–79, 82, 85  
 medical genetics, 35, 48  
 Mei-Di, S., 7, 25  
 Melton, D. W., 35, 38, 39  
 memory  
     and cytoplasm, 167  
     genetic, 160  
     and heredity, 173  
 Mendel, G., 3, 28, 31, 74, 77, 78, 90, 221, 248, 249, 261, 262, 263, 265, 266, 267, 268, 269, 274, 284, 287, 298, 304, 337  
 Mendelism, 75–76, 268–69  
 methylation, 19, 185, 233, 250–51  
 Metz, C., 104, 114  
 microevolution, 97, 178, 179, 182  
 micromutation, 97, 197  
 mobile genetic elements, 231, 294  
 Modern Synthesis and Developmental Synthesis, 178–81, 187  
 Moles, A. A., 222, 238  
 Monod, J., 123, 162, 172, 177, 196, 197, 211, 212, 213, 228, 229, 238, 273, 292, 306, 313, 328, 332, 346  
 Morange, M., 178, 181, 183, 191, 197, 198, 213, 225, 226, 236, 238, 332, 333, 335, 340  
 Morata, G., 198, 210, 213  
 Morgan, T. H., 29, 30, 31, 32, 33, 34, 39, 78, 79, 90, 93, 194, 197, 213, 264, 267, 268, 271, 272, 273, 275, 284, 287, 321, 322, 323, 334  
 morphogenetic axis, 208  
     fields, 275  
 Morris, D. R., 10, 24  
 mosaic theory of development, 264, 271–72  
 Moss, L., 175, 176, 177, 278, 284  
 Muller, H. J., 39, 87, 90, 93, 94, 96, 97, 98, 100,

Cambridge University Press

0521771870 - The Concept of the Gene in Development and Evolution: Historical and Epistemological Perspectives

Edited by Peter J. Beurton, Raphael Falk and Hans-Jörg Rheinberger

Index

[More information](#)*Index*

- Muller, H. J. (*cont.*)  
 101, 102, 104, 106, 114, 116, 136, 220, 226,  
 238, 261, 268, 284, 287, 288, 291, 292, 313,  
 323, 324, 326, 334, 337, 338, 339, 343, 347
- multilevel hierarchy of genetic units, 92, 95,  
 106–09, 296
- Murre, C., 185, 191
- mutation rates  
 abstract, 290  
 uneven, 133, 144  
 variability of, 148
- mutations  
 directed, 37, 233, 27  
 induced, 93  
 Morgan's nomenclature of, 29  
 neutral, 298  
 point, 130, 133, 141, 144, 148, 232  
 radiation as a source of, 93–94, 100, 119,  
 123–43  
 rearrangement versus, 94, 100  
 systemic, 97  
 targeted, 35, 36, 118
- muton, 57, 137, 138, 151 153, 222, 292, 327
- MyoD* gene, 178, 181, 183–84, 187–88, 201
- Nadal-Ginard, B., 294, 313
- Nagel, E., 242, 255, 256, 259, 284
- Nägeli, C., 262
- natural kinds, 80, 327
- nature versus nurture, 317–18, 338
- Nauta, W. J. H., 34, 39
- Nelkin, D., 317, 347
- Neumann-Held, E., 278, 284
- neutral theory of evolution, 297–98
- Newman, S. A., 175, 177
- Newton, I., 264
- Nielsen, F. C., 13, 25
- Nilsson-Ehle, H., 28
- Nirenberg, M. W., 223, 228, 238
- Norton, B. J., 83, 90
- null development, 247, 259
- Nüsslein-Volhard, C., 188, 198, 199, 214, 333,  
 347
- Olby, R., 227, 238
- Oliver, S. G., 36, 39
- one-to-one relations between  
 enzyme and gene, 341  
 gene and character, 226  
 gene and enzyme, 3, 131, 194, 226, 227,  
 288, 323, 324, 328–29, 342  
 gene and polypeptide, 8  
 gene and product, 9, 295, 329  
 gene and protein, 327  
 genes and traits, 26–27, 30, 37  
 polypeptide and gene, 8, 14  
*see also* blueprint, many-to many relations
- operationalism, 87, 320  
 operationalist interpretation of genetics,  
 79  
 operationalist view of the gene, 324  
 operationalists in genetics, 321  
 operon model of gene, 172, 184, 188n2, 196,  
 225, 228, 270–76, 292, 306, 329
- Opitz, J. M., 179, 181, 190, 211
- organizer, 275  
 Spemann's organizer, 202
- overlapping genes, 8, 11, 80, 293, 294, 304,  
 305
- Oyama, S., 175, 177, 280, 281, 284
- pangenes, 262, 287, 320
- pangenesis, 72–73, 88n3
- Pasteur, L., 124
- Patel, N. H., 180, 188, 204, 208
- Paterson, B. M., 185, 190
- Pattee, H., 234, 239
- Patton, J. G., 294, 313
- pax* gene, 200, 204–05
- Pearson, E. S., 83, 90
- Pearson, K., 73, 74, 75, 83, 86, 90, 320
- phage biologists, group of, 122–23, 126, 128,  
 132, 139
- phenomenalism, 87  
 phenomenalist interpretation of heredity,  
 69, 75, 86
- Piaget, J., 82, 90
- Piatigorsky, J., 182, 191, 206, 214, 348
- Plough, H. H., 94, 95, 98, 99, 100, 114
- Polanyi, M., 234, 239
- Pontecorvo, G., 118, 119, 120, 124, 126, 127,  
 128, 132, 134, 135, 137, 153, 155, 326, 347
- Popper, K., 255
- population genetics  
 and downward causation, 305–07  
 and reductionism, 288–91, 307–08
- population relativity of "genetic," 40–66
- Portin, P., 6, 23, 25, 81, 90, 111, 114, 115, 116,  
 153, 155, 222
- Portugal, F. H., 227, 239
- position effect, 92–95, 97–98, 104–06, 117,  
 324–25
- posttranscriptional modification of gene  
 products, 13, 15, 229
- posttranslational modification of gene prod-  
 ucts, 9–10, 13, 187, 230, 330
- progeneration, 243–52, 255–57, 259, 279n6,  
 341
- program  
 data and, 161, 162–63, 170, 176n6, 235  
 developmental and genetic, 159–76  
 origin of concept, 162, 172, 176n7  
*see also* information
- Prokofyeva, A., 94, 114

*Index*

- promoter, 5, 292  
   multiple promoters, 15  
   staggered promoter sites, 6  
   TATA box, 5–6
- protein isoforms, 8, 293
- protein synthesis, 172, 183, 346
- Provine, W. B., 88, 90, 284
- pseudoalleles, pseudoallelism, 117–20, 128, 183, 195, 269
- pseudogenes, 18, 231, 293
- Punnett, R. C., 28
- Quiring, R., 180, 191, 205, 214
- Raff, R. A., 179, 181, 190, 191, 197, 211, 214, 277, 284
- Raffel, D., 94, 102, 114, 324, 347
- Read, A. P., 8, 13, 25
- reading frame, 12, 293  
   frame shifting, 230  
   open reading frame (ORF), 6, 11, 330
- realism, 87, 320, 326  
   and molecular biology, 80–82  
   realist interpretation of heredity, 70, 326
- recessive factors (traits), 266–67  
   homozygotes, 77  
   lethals, 323
- recessiveness, 266
- recon, 57, 137, 138, 150–51, 153, 222, 292, 327
- recon, muton, and cistron, 57, 137, 150, 153, 222, 292, 327
- reductionism, 254–58, 289, 308–10  
   heuristic and scientific, 240  
   methodological, 117  
   and population genetics, 288–91, 307–08  
   research strategy, 242
- reductionistic, reductionist, 22, 63, 231–42, 279, 291, 330–33, 340–41  
   theories, 262, 289
- regression analysis, 73–74
- regulator genes  
   and genetics of development, 198  
   part of the regulatory network, 188, 201  
   significance for evolution, 197  
   versus structural genes, 197, 292
- Rembold, H., 235, 237
- repetitive DNA, 229, 232, 293
- replicator, 242–45, 261, 279, 280, 290, 310
- reproducer, 243–45, 253, 279n6
- retroposition, 232, 293
- reverse transcription, 293
- reversion  
   in ancestral heredity, 74  
   of mutations, 135, 138
- Rheinberger, H.-J., 81, 92, 114, 116, 147, 148, 149, 155, 224, 239, 288, 317, 330, 340, 341, 342, 343, 344, 345
- ribosomal RNA, 223–24, 229
- ribosome, 6, 12, 230, 275  
   ribosomal assembly, 12  
   ribosomal complex, 17
- Richmond, M., 91, 114
- Rimoin, D. L., 55, 56, 66
- Robinson, G., 262, 284
- Roll-Hansen, N., 27, 39
- Roper, J. A., 134, 135, 155
- Rosenberg, A., 54, 66
- Rotman, R., 120, 155
- Ruddle, F., 184, 190, 198, 210, 213
- Russian school of genetics, 195
- Saha, M., 195, 202, 214
- Saint-Hilaire, G., 205
- Saint-Jeanne, J.-P., 190, 211
- Salmon, W., 268, 284
- Salthe, S. N., 325, 347
- Sapienza, C., 293, 312
- Sapp, J., 175, 177, 194, 214, 262, 264, 271, 274, 275, 281, 282, 284, 324, 347
- Sarkar, S., 28, 39, 222, 228, 236, 239, 242, 246, 255, 257, 258, 259, 278, 281, 285, 311
- Sasai, Y., 180, 189, 205, 209
- Schaffner, K. F., 307, 308, 313
- Schoenbach, L., 301, 312
- Schrödinger, E., 82, 90, 173, 301, 313
- Schuster, P., 234, 237
- Schwartz, S., 29, 39, 112, 180, 227, 269, 321, 322, 334
- Scott, M. P., 200, 211, 212, 214
- selector genes, 198
- selfish genes, 290, 296, 310
- sex determination, 105, 110, 179
- Shakespeare, W., 317
- Shastry, B., 36, 39
- short interspersed sequences (SINEs), 229
- Shubin, N., 180, 192, 204, 214
- Simpson, G. G., 182
- Singer, M., 152, 155, 295, 313
- Slatkin, M., 252, 285
- Smith, C. W. J., 294, 313
- Smith, K., 58, 59, 60, 66, 280, 281, 285
- Sonenberg, N., 13, 25
- Sordino, P., 180, 192, 204, 215
- Sosa, E., 33, 39
- specificity  
   of DNA, base sequence, 140, 288, 327  
   of mutation, 146  
   of protein function, 332
- Spemann, H., 195, 202, 215
- Spiegelman, S., 184
- splicing, 6–8, 229, 293  
   alternative, 7–10, 20–21, 230, 293  
   DNA splicing, 231  
   protein splicing, 230

*Index*

- splicing (*cont.*)
  - RNA splicing, 80, 229, 294
- spontaneous mutation, 93–96, 98–100, 140–41, 144, 204
- Stadler, L. J., 226, 239, 321
- Stahl, F., 148, 155, 328, 347
- Star, S. L., 92, 114, 220, 239
- steady state inheritance systems, 251
- Stebbins, G. L., 182
- Steltz, J. A., 7, 25
- Stent, G. S., 79, 89, 175, 177, 235, 334, 347
- Sterelny, K., 280, 281, 285
- Stern, C., 91, 93, 114, 334
- Stevens, T. H., 230, 237
- Stigler, S. M., 74, 90
- Strachen, T. S., 8, 13, 25
- Sturtevant, A. H., 39, 90, 93, 117, 284
- Sutton, E., 100
- Szathmáry, E., 251, 253, 278, 281, 284, 285, 301
- Tabin, C., 180, 192, 204, 214
- Taparowsky, E. J., 192
- Tatum, E. L., 30, 38, 226, 288, 312, 324, 329, 332, 345
- teleology, 162
- Thomas, R., 176, 209, 345
- Timoféeff-Ressovsky, N., 226, 239
- Tomarev, S. I., 336, 347
- top-down analysis, 46
  - approach, 45
  - explanations, 340
  - see also* downward causation
- topography of fine structure of the gene, 144, 148–50
- topology of fine structure of the gene, 132, 139, 140–42, 144, 148, 150
- traits, alternative, 300
  - alternative appearance of (AAT), 26–27, 30–36
  - determinable/determinate, 26–27
- transcription, 4, 5, 165, 185, 275, 292
  - activation, 16, 170
  - factors, 180, 185
  - regulating sites, 19
- translation, 9, 13, 165, 292, 343
  - translational, 12–13, 230
- transmission
  - conception of heredity, 320
  - fidelity, 245, 256
  - genetics, 53–54, 265, 321, 322, 326–27
- Tycowski, K. T., 7, 25
- unit characters, 28, 221, 321, 329
- unit of inheritance, 4, 343
- units of heredity (inheritance), 4, 19, 83, 102, 140, 226, 240, 343, 345n11
  - elementary, 137, 139, 148
  - see also* units of selection
- units of selection, 57, 242–43, 245, 306–09
  - gene as the smallest, 299, 310
- Ursprung, H., 176, 177
- vague concepts, 222
  - entities, 220, 235, 343
  - objects, 221, 224
  - see also* fuzzy appearance, epistemic entity
- van der Hoeven, F., 180, 192, 204, 215
- van Fraassen, B., 256, 268, 285
- Van Valen, L., 250, 345
- Vicedo, M., 28, 39, 344, 348
- Vilmorin, L., 71, 90
- Vischer, E., 227, 239
- Waddington, C. H., 176, 177, 181, 182, 192, 195, 197, 215, 277, 334
- Wade, M., 250, 252, 281, 283, 284, 285
- Waldrop, J. M., 171, 177
- Waring, M., 293, 313
- Waters, K., 31, 39, 49, 50, 66, 322, 342, 343, 348
- Watson, J. D., 3, 24, 79, 80, 89, 90, 128, 155, 227, 286, 288, 313, 321, 326, 327, 338, 348
- Weintraub, H., 185, 186, 187, 189, 190, 191, 192
- Weismann, A., 86, 87, 88, 90, 233, 262, 263, 273, 280, 285, 320, 334
- Weismannism, 248–49, 263–64, 272–73, 333
  - Weismannist constraint, 248
- Weiss, R. B., 12, 24
- Wenrich, D., 104, 114
- Wiener, N., 173
- Wieschaus, E., 198, 199, 214, 333, 347
- Williams, G. C., 243, 285, 290, 309, 313
- Wilson, A. C., 197, 198, 212, 215
- Wilson, E. B., 27, 179, 192, 264, 285
- Wilson, E. O., 302, 312
- Wimsatt, W. C., 242, 245, 255, 258, 264, 280, 281, 283, 285, 311, 314, 334
- Wolpert, L., 163, 173, 176, 177, 203, 215
- Wood, W. G., 16, 25
- Woodward, J., 268, 285
- Wright, S., 289, 291, 308, 314, 331
- Xu, W. H., 9, 25
- Yanofsky, C., 228, 239, 328
- Zadeh, L., 236, 239
- Zallen, D. T., 184, 189, 194, 209
- Zamecnik, P. C., 236, 239
- Zamenhoff, S., 227, 239
- Zimm, B. H., 328, 347
- Zimmer, K., 226, 239
- zootype, 207