Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index

Page numbers in bold indicate Glossary items 3q29 microdeletion schizophrenia risk factor, 159-160 5-HT, See serotonin 23andMe, See direct-to-consumer genetic testing abnormal, 372 activator proteins, 81, 372 active genotype-environment correlation, 372 addiction, 248 brain structures involved in, 132-135 diagnosing substance use disorders, 251-252 heritability of substance use disorders, 264 lay understanding of, 248 prevalence of substance use, 248-250 prevalence of substance use disorders, 249-252 psychoactive substances, 248, 250 withdrawal syndromes, 251 addiction neurobiology activation of the brain reward system, 254 anhedonia and risk of relapse, 254 binge/intoxication stage, 254-255 compulsive drug-seeking behavior, 256-257 craving, 256-257 development of tolerance, 254-255 downregulation of the brain reward system, 254-255 homeostatic neuroadaptation, 254-255 negative reinforcement, 255-256 nucleus accumbens and the reward pathway, 255 positive reinforcement, 254 preoccupation/anticipation stage, 256-257 stages of, 254 withdrawal/negative affect stage, 255-256 additive genetic effects, 372 additive genetic variance, 52 adenine, 79 adenosine triphosphate (ATP), 119, 372 adoption studies, 372 estimating heritability in humans, 63 affiliation. 372

affiliation and attachment autism spectrum disorder, 317-319 definition of affiliation, 314 definition of attachment, 315 individual differences and variation in oxytocin genes, 315-316 oxytocin knockout mice, 316 oxytocin system variants as candidate genes, 316-317 Research Domain Criteria (RDoC) construct, 314 role of oxytocin, 314-319 aggression, 324-326 Brunner syndrome, 324 genes associated with human aggression, 326 genetic variation and individual differences, 324-326 measuring aggressive behavior, 324-325 proactive aggression, 324 range of aggressive behaviors, 324 reactive aggression, 324 stabilizing selection, 324 aggressive behaviors, 372 agonistic behavior, 308-309, 372 agonists, 136, 372 agricultural revolution, 352, 372 alcohol dehydrogenases (ADHs), 265 alcoholism risk and protective mutations, 266 alcohol dependence (ICD-11), 253 alcohol flushing response, 372 alcoholism risk and, 265-267 alcohol use prevalence of, 249-250 alcohol use disorder alcohol dependence (ICD-11), 253 alcohol flushing response and alcoholism risk, 265-267 brain structures involved in addiction, 263 candidate gene studies, 270-271 diagnosing, 251-252 ethanol metabolism, 265

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 395

familial nature of alcohol problems, 262-264 genetically engineered mouse models, 261 genome-wide association studies, 271-272 heredity and alcohol-related behavior in fruit flies (D. melanogaster), 261-262 heritability estimate, 264 high- and low-drinking rat lines, 267-269 influence of alcohol metabolizing genes, 265-269 large number of genes contribute to risk, 269-272 measures of family history, 262-263 non-human animal models, 257-262 prevalence of, 249-252 prospective longitudinal studies of alcoholism risk, 263 QTL (quantitative trait loci) mapping in rodents, 259-261 risk and protective mutations in ADH, 266 rodent strain comparisons for alcohol preference, 257-259 withdrawal syndrome, 251 aldehyde dehydrogenases (ALDHs), 265 alexithymia, 196, 372 all-or-none action potentials, 372 alleles of a gene, 33, 372 alloparental care, 372 alternative splicing of mRNA, 82, 372 Alzheimer disease, 119, 180, 372 age at onset, 184-190 amyloid plaques, 185-187, 189 burden of disease, 185-190 cause of neurocognitive disorder, 184 dementia due to Alzheimer disease (ICD-11), 185 diagnosis, 185-187 early and late onset variants, 187-189 genetic variants associated with risk for, 187 - 189neurofibrillary tangles, 185, 189 non-human animal models, 189 prevalence, 184 risk related to apolipoprotein E (APOE) variants, 187-189 role of APP (amyloid precursor protein) processing, 185-188 role of the KIBRA protein in memory formation, 180-182 signs and symptoms, 185-187

tau protein, 189 Trisomy 21 (Down syndrome) risk factor, 174-175, 185-187 using genetic information in diagnosis, 185-187 Alzheimer disease risk direct-to-consumer genetic testing, 333 amino acids, 372 chemical structures of, 81 effects of altered amino acid sequences, 100 - 101how DNA nucleotide bases code for amino acids, 83-84 process of constructing proteins, 81-84 sequence in proteins is specified by DNA sequence, 81-84 types of, 81 amnion, 372 amygdala genetic differences in activation in response to threat, 197-198 role in processing emotional information, 197-198 role in response to threats, 223 amyloid plaques, 185-187, 189, 372 ancestral reference populations, 372 ancestry reports direct-to-consumer genetic testing, 334-336 aneuploidy, 99, 373 Angelman syndrome, 87 anhedonia, 373 animal models. See non-human animal models animalculists, 26-27, 373 annealing (in PCR), 373 anorexia nervosa. See eating disorders antagonists, 136, 373 anticodons, 82, 373 antisocial alcoholism, 373 antisocial personality disorder, 264 anxiety, 373 behaviors associated with, 223-225 defensive circuits provide information about potential threats, 223 defensive response to threat, 222-223 definition of, 222-223 effects of domestication, 228-229 genetics of fear and anxiety in mice, 225-226 individual differences in public-speaking anxiety, 222

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

396 Index

anxiety (cont.) research paradigms, 223-225 role of HPA axis components, 227-228 role of the GABA neurotransmitter system, 226 - 227role of the serotonin transporter system, 227 anxiety disorders, 174 anxiety and fear-related disorders (ICD-11), 232 candidate gene association studies, 234-235 familial inheritance, 234 generalized anxiety disorder, 232 genome-wide association studies, 235-236 Million Veteran Program, 235-236 obsessive-compulsive or related disorders (ICD-11), 237 polygenic nature, 234 prevalence of, 231-233 types of, 231-232 anxiety-related personality traits candidate gene association studies and GWAS, 230-231 heritability estimates, 229-230 phenotypes for genetic analysis, 229-231 study of neuroticism, 229-231 apolipoprotein E (APOE) variants Alzheimer disease risk, 187-189 apoptosis, 126, 373 applied research, 373 appraisal, 373 Aryans, 373 ataxia, 373 attachment, 373 attachment styles, 308, 373 See also affiliation and attachment attention bias, 225, 373 attention-deficit/hyperactivity disorder (ADHD), 172, 174, 203 autism spectrum disorder, 162, 172, 174-175, 203, 317-319, 373 genetic influences, 317-319 heritability estimates, 317 ICD-11 diagnosis, 319 potential genetic risk factors, 126-128 prevalence, 317 autonomic nervous system, 196, 223 autosomal dominant inheritance, 42-43, 373 autosomal recessive inheritance, 43-44, 373 autosomes, 37, 73, 373

Avery, Oswald, 77 axon, 373 axon hillock, 373 axon terminal, 373 backcross, 38-41, 373 Bakewell, Robert strategy for breeding sheep, 28 basal metabolism, 281, 373 basic research, 373 Bateson, William, 46 BDNF (brain-derived neurotrophic factor) role in depressive disorders, 216 BDNF (brain-derived neurotrophic factor) gene, 135 behavior genetics, 373 applied research, 331 approach to mental illness research, 149-153 avoiding oversimplification of effects of genetic variation, 15 basic research, 331 caution about the interpretation of heritability estimates, 369 combination of genetic and environmental variations, 12 defining a gene, 91-92 essential role of non-human animal models, 16 - 20ethical limits with human participants, 16-17 ethical oversight of research, 20-22 focus on individual differences, 10 identifying gene-behavior associations, 14-15 importance of genetic variation, 94 influence of genomic sequence variation on behavior, 91-92 levels of analysis, 13-15 molecular mechanisms of pathways from gene to behavior, 14-15 population thinking versus typological thinking, 12-13 racial differences are not the focus, 369 real-life applications, 331 reliable and valid measures of behavior, 10-11 research findings and future developments, 345-348 responsibility to respect human rights, 369 role in eugenics, 351 role of genes in behavior, 14-15 shared evolutionary history across species, 17 - 19

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 397

strong genetic explanation, 346-347 testing for genetic differences between individuals, 11-15 three basic types of questions for researchers, 14-15 use of convergent evidence, 16 weak genetic explanation, 346-347 behavior genetics studies emotions, 198-199 behavioral studies, 373 emotions, 198 behaviorism, 8-9 bell curve. See normal distribution Bell, Alexander Graham, 358 Belyaev, Dmitri, 228 benzodiazepines, 226 Big Science, 198 binding affinity, 136, 373 Binet-Simon test, 363 binge drinking, 374 bioavailability of drugs, 137, 374 biomedical research impact of the Human Genome Project, 113-115 Biometricians, 46-47, 374 bipolar and related disorders characteristics, 201 diagnosis of Bipolar type I disorder (ICD-11), 202 familial inheritance, 202 genetic correlation across psychiatric disorders, 202-203 genetic risk factors, 202-203 heritability, 202 ICD-11 diagnosis, 201 polygenic traits, 202-203 prevalence of, 202 private damaging mutations, 163 black-backed jackal (Canis mesomelas), 309 blending inheritance, 32, 374 blood alcohol concentration, 374 Bloomington Drosophila Stock Center, 41-42, 183 body dysmorphic disorder, 237 body mass index (BMI), 284-285, 374 body-focused repetitive behavior disorders, 237 bonobo (Pan paniscus), 170 brain structures involved in addiction, 263 brain development

apoptosis process, 126 impact of genetic variations on neurological functions, 126-128 neurogenesis, 126 synaptogenesis, 126 brain reward system, 374 brain structure impacts of genetic variation, 132-135 bred true, 374 breeding true, 31 Bridges, Calvin, 41 broad sense heritability, 374 Brunner syndrome, 324, 374 Buck v. Bell eugenics test case (1927), 360-362 Buck, Carrie, 360-362 bulimia nervosa. See eating disorders Burbank, Luther, 358 calories, 374 cancer risk reports direct-to-consumer genetic testing, 334 candidate gene association studies, 108, 132, 374 candidate genes, 374 Canis lupus familiaris, See dog Capecchi, Mario R., 111 Carnegie, Andrew, 357-358 carrier screening direct-to-consumer genetic testing, 333 Celera Genomics, 113 Celexa, 137 cell division producing diploid cells by mitosis, 76-77 producing haploid gametes by meiosis, 74 - 76cells basic cellular functions, 117-119 cytoplasm, 117 Golgi apparatus, 119 lysosomes, 119 membrane, 117-118 mitochondria, 119 nucleus, 119 organelles, 117 rough endoplasmic reticulum, 119 smooth endoplasmic reticulum, 119 centimorgans (cM), 41, 374 central nervous system, 374 centromere, 374 Chase, Martha, 78

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

398 Index

childhood maltreatment, 374 risk factor for negative outcomes, 307-308 chorion, 374 chromatids, 74-75, 374 chromatin, 86, 374 chromatin remodeling, 81, 374 chromosomal theory of inheritance, 37 chromosomes, 374 aneuploidy, 99 autosomes, 73 centromere, 74-75 chromatids, 74-75 chromosomal theory of inheritance, 73 dosage compensation, 87 homologous pairs, 74 human karyotype, 74 imprinted inactivation, 87 making copies by DNA replication, 80 mapping relative positions of genes on, 36-41 meiosis (producing haploid gametes), 74-76 mitosis (producing diploid cells), 76-77 nature of human chromosome 21, 175 non-allelic homologous recombination, 314 physical basis of Mendelian inheritance, 73 prevalence of chromosomal abnormalities in humans, 174 recombination (crossing over) during meiosis, 75-76 role of DNA, 77-79 sex chromosomes, 73 structure and functions, 73-77 X-chromosome inactivation, 87 citalopram, 137 civil rights movement impact of eugenics, 368 classical conditioning, 254 ClinVar database (NCBI), 332 codons, 83-84, 374 Cold Spring Harbor Laboratory, 358 Collins, Francis, 113 color vision deficiency X-linked recessive inheritance pattern, 44 comorbidity, 374 complementary base pairing, 374 complementation test, 282, 375 compulsions, 375 compulsive behavior, 375 COMT (catechol-O-methyltransferase) gene, 135 concentration camps, 375

concordance, 375 conditional knockout techniques, 111, 375 conservative mutations, 375 convergent evidence, 16, 375 role in understanding heredity-behavior relations, 101 copy number variants, 98, 375 detection and measurement, 106-107 schizophrenia risk, 159-160 corticotrophin hormone receptor gene (CRHR1) variants, 231 courtship behavior, 308, 375 COVID-19 rapid development of mRNA vaccines, 115 CpG islands in DNA, 86, 375 craving, 375 Crick, Francis, 78 CRISPR-Cas9 technique, 111-112, 375 cross-fostering designs, 375 cross-sectional studies, 375 crossing over, 375 crossover events during gamete formation, 39-41 crossover interaction, 54-56, 375 culture differences in emotions, 194 cystic fibrosis, 333 cytochrome P 450 enzymes, 375 genetic variability, 139-140 cytoplasm, 375 cytosine, 79 Darwin, Charles, 4, 6, 195, 228 natural selection in human populations, 352-353 theory of evolution, 4-5, 354 Davenport, Charles, 358, 364, 366 de novo mutations, 375 declarative memories, 179, 376 decreasing alleles, 47, 376 defensive circuits, 376 degenerate characterisic of the genetic code, 376 demand characteristics, 376 dementia due to Alzheimer disease (ICD-11), 185 dementia risk Trisomy 21 (Down syndrome), 174-175 denaturation (in PCR), 376 denature (protein), 376 dendrites, 376

deoxyribonucleic acid, *See* DNA depolarizing input (neuron), **376**

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 399

depression-like behavior, 376 in mice, 49-50 selective breeding in rats, 63-64 depressive disorders burden of disease, 204-206 candidate gene association studies, 208-210 characteristics of, 201-202 DALYs caused by, 204-206 family and twin studies, 206-208 genetic correlation across psychiatric disorders, 202-203 genetic epidemiology, 206-208 genome-wide association studies (GWAS), 210 heritability estimates, 206-208 ICD-11 diagnosis, 201, 204 individual differences in response to SSRIs, 212 linkage studies, 208 monoamine hypothesis of depression, 211 non-human animal models of depression, 212-216 polygenic risk scores, 210-211 prevalence, 204-205 question of adequacy as a phenotype, 206 response to antidepressant medications, 211-212 role of 5-HTTLPR variants, 208-210 role of BDNF, 216 role of the HPA axis, 215-216 studies of genetic mechanisms, 208-212 symptom heterogeneity, 204-206 symptoms, 204 designer babies, 343-345 genetically engineered human babies, 344-345 pre-implantation genetic screening, 343-344 sex selection, 320-323 views on human genetic engineering, 343 developmental learning disorder (ICD-11), 177 diabetes in obese mice, 281 Diagnostic and Statistical Manual of Mental Disorders. See DSM diathesis-stress model, 148, 376 diazepam, 226-227, 376 differential sensitivity hypothesis, 148-149, 376 differentiation of cells, 376 diffusion process, 376

dihybrid cross, 376 backcross, 38-41 independent assortment of traits, 37-38 linkage, 38-41 Punnett square, 36 recombinant types, 38-41 work of Gregor Mendel, 35-36 diploid (2n), 376 direct-to-consumer genetic testing ancestry reports, 334-336 availability of, 331-332 cancer risk reports, 334 carrier screening, 332-333 ClinVar database (NCBI), 332 concerns about, 336 genetic weight reports, 334-335 health risk reports, 333 interpretation of reports, 336 miscellaneous features and traits reports, 334 pharmacogenetic reports, 333-334 potential for unexpected information about relatives, 336 privacy of personal genetic information, 336 types of reports provided, 331 wellness reports, 334-335 disability-adjusted life years (DALYs), 145-147, 376 leading causes worldwide, 204-206 DISC1 gene schizophrenia studies, 164 discovery sample, 376 disorders of intellectual development (ICD-11), 171 dizygotic twins (DZ), 376 DNA, 376 codon sequence specifies amino acid sequence in proteins, 81-84 codons, 83-84 complementary base pairing, 78-79 confirmation as the genetic material, 77-79 CpG islands, 86 discovery of, 77 discovery of the structure of, 65 double helix structure, 78-79 epigenetic marks, 87 exons, 82 forensic DNA phenotyping, 341 four bases, 77 histone modifications, 86-87

histone packing, 81

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

400 Index

DNA (cont.) how four nucleotide bases code for amino acids, 83-84 introns, 82 methylation and demethylation, 86-87 nucleotide bases, 78-79 process of constructing proteins, 81-84 replication process, 80 transcription (making mRNA), 73-81 translation into proteins, 82-84 DNA fingerprinting, 340, 377 DNA polymerase, 80, 102-103, 377 DNA profiles, 340 DNA sequencing, 103-105 gel electrophoresis, 104-105 Next generation sequencing, 105 Sanger sequencing, 104-105 dNTPs (deoxynucleotide triphosphates), 103, 377 Dobzhansky, Theodosius, 17, 41, 94 dog (Canis lupus familiaris) as model organisms, 18 concept of the dog breed, 6-7 genes associated with human-directed sociability, 314 genome, 94-95 morphological and behavioral diversity, 6-7 prevalence of genetic disorders in dog breeds, 8 selective breeding for certain traits, 6-8 similarity of dog and human diseases, 8 use in behavior genetics studies, 9 dog (Canis lupus familiaris) model neurobiology of fear and anxiety, 239-240 dog breed, 377 domestication syndrome, 377 silver fox (Vulpes vulpes) study, 228-229 dominance genetic variance, 52-53 dominance hierarchies, 308, 377 dominance variance (V_D), 377 dominant allele, 377 dominant traits, 32-33 dopamine hypothesis of schizophrenia, 156, 377 dopamine receptor D2 (DRD2), 210 dosage compensation, 377 dosage sensitive genes, 377 dose dependent effects, 377 double crossovers, 41, 377 Down syndrome, 99, 174-176, 377 characteristics of, 174-175 dementia risk, 174-175

incidence of trisomy 21, 174 mouse models of Trisomy 21, 175-176 risk factor for Alzheimer disease, 185-187 drinking in the dark assay, 259, 377 Drosophila melanogaster, See fruit fly (Drosophila *melanogaster*) drugs agonists, 136 antagonists, 136 bioavailability, 137 full agonists, 136 genetic variations moderate effects on neural activity, 138-140 impacts on neural activation, 136-137 inverse agonists, 136 monoamine oxidase inhibitors (MAOIs), 137 partial agonists, 136 SSRIs (selective serotonin reuptake inhibitors), 137-139 DSM, 376 DSM-5, 149 DSM-5 diagnosis specific learning disorder, 177 DTNBP1 gene schizophrenia studies, 164 dyscalculia, 177 dysgraphia, 177 dyslexia, 177, 377 genes involved in neuronal migration, 178 non-human animal models, 178 early onset Alzheimer disease (EAOD), 377 early onset disorder, 377 early onset forms of disorders, 238 eating disorders anorexia nervosa, 203 anorexia nervosa diagnosis, 292 bulimia nervosa diagnosis, 292-293 candidate gene association studies, 294 diagnosis, 292-293 endophenotypes and, 295 feeding or eating disorders (ICD-11), 290 genetic correlations with other disorders, 295 genome-wide association studies, 294-296 heritability estimates, 293 mortality rate for anorexia nervosa, 292 prevalence of, 290 role of puberty in disordered eating, 293-294

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 401

tendency to run in families, 293 types of, 289 eating habits appetite control circuits, 283-284 body mass index (BMI) and obesity, 284-285 energy balance, 281 evolutionary forces, 279-281 food availability and, 279-280 health impacts of being overweight or obese, 287 nutrition transition, 279-281 obesity in mice with defective leptin signaling, 281-283 rates of obesity, 284 role of leptin in appetite control, 281-283 susceptibility to obesity, 279-281 thrifty genotype hypothesis, 279-281 weight control, 279 electrodermal response, 225, 377 electroencephalograms (EEG), 196-197 electrostatic pressure, 377 elevated mazes, 224, 378 elongation (in PCR), 378 emotion regulation, 378 difficulties may lead to psychopathology, 199-201 emotional problems, 199 externalizing disorders, 200 heritability of emotion regulation traits, 200-201 internalizing disorders, 200 mental illness and, 201 process model, 200 strategies, 200 emotional problems, 199, 378 emotions, 194 alexithymia, 196 autonomic nervous system, 196 behavior genetics studies, 198-199 behavioral studies, 198 cognitive appraisal component, 194-195 communication of, 195 cultural and language differences, 194 defining, 194-195 distinction from feelings, 194 genetic differences in amygdala activation in response to threat, 197–198 heritability of neuroticism trait, 199 in animals, 195

interoception, 194 listing all human emotions, 194 measuring brain activity associated with, 196-198 methods for measuring, 196-199 neuroticism personality trait and, 196 physiological measures, 196 preparation for action, 195 role of the amygdala in processing emotional information, 197-198 schadenfreude, 194 self-report questionnaires, 196 SNP heritability estimates, 198-199 Enclosure Acts, 352, 378 endocannabinoid system, 378 role in "runner's high," 300-301 endophenotypes, 151-153, 378 genetic correlations between different disorders, 295 schizophrenia, 160-161 Enhancing NeuroImaging Genetics through Meta-Analysis (ENIGMA) Consortium, 198 environmental effects, 378 environmental factors, 378 environmental risk, 378 environmental variance, 378 contribution to phenotypic variance, 48-51 genotype-environment correlations, 56 genotype-environment interaction, 54-56 influence on genotypes, 54-56 measurement error as source of, 53-54 non-shared environmental factors, 54 potential to increase or decrease similarity, 54 shared environmental factors, 54 sources of, 53-56 epigenetic marks, 378 epigenetic processes DNA methylation and demethylation, 86-87 effects of life experiences on gene expression, 88 effects of maternal behavior in early life, 88 epigenetic marks, 87 histone modifications of DNA, 86-87 imprinted inactivation, 87 imprinting (parent-of-origin dependent gene expression), 87-88 influence on gene expression, 85-88 transgenerational epigenetic inheritance, 88-89 X-chromosome inactivation, 87

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

402 Index

epigenetics, 378 episodic memories, 179, 378 epistasis, 52-53, 378 equal environments assumption, 378 escitalopram, 137 ethical implications of genomic research, 114 ethical issues use of non-human animal models instead of human subjects, 16-17 use of non-human animals for research, 19 ethical oversight of research, 20-22 history of unethical research practices, 21 human research participants, 21-22 Institutional Animal Care and Use Committees (IACUCs), 20-21 Institutional Review Boards (IRBs), 21-22 non-human animal subjects, 20-21 ethics committees, 21 ethyl methanesulfonate (EMS), 110 euchromatin, 86, 378 eugenics, 6, 8-9, 12, 46, 67, 378 American Breeders Association, 358-359 Buck v. Bell test case (1927), 360-362 case of Carrie Buck, 360-362 Cold Spring Harbor Laboratory, 358 Darwin and natural selection, 352-353 Darwin's theory of evolution, 354 decision of Supreme Court Justice Oliver Wendell Holmes, Jr., 361 Eugenics Records Office, England, 355 Eugenics Records Office, United States, 356-359 exported from America to Nazi Germany, 364-366 extending the reach of American eugenics, 358-359 funding by philanthropists in the United States, 357-358 Galton Professorship of Eugenics, University of London, 355 Galton's theory of eugenics, 354-355 Goddard's work on IQ tests, 363 Harry H. Laughlin and the ERO, 358-359 Hitler's inspiration from American eugenics, 364-365 impact on the civil rights movement, 368 in post-WWII United States, 367-369 influence of Laughlin on compulsory sterilization law, 360-361

influence of Madison Grant, 364 influence of the Kallikak family study by Goddard, 356-357 influence on immigration policy in the United States, 362-363 institutionalization in the United States. 356-359 institutionalizing eugenics in England, 355 International Federation of Eugenic Organizations, 364 involuntary sterilization laws in the United States, 359-362 Laughlin's influence on immigration policy, 363 laws banning interracial marriage, 367 Lebensborn Program in Nazi Germany, 365-366 Malthusian argument, 352-353 master race notion originated in the United States, 356 Nazi Germany, 364-366 notions of superiority and inferiority, 366-367 opposition to support for the poor, 352-353 origins in the eighteenth century, 352-353 promotion by Charles Davenport, 358 promotion of racism by Jensen, 368 promotion of racism by Shockley, 367-368 push for legalization by Albert Priddy, 360-361 racial classifications, 367 racial differences are not the focus of behavior genetics, 369 racial focus, 366 racism and, 351 rediscovery of Mendel's work, 354 role of behavior genetics in, 351 scientific racism, 352-353 Social Darwinism, 351-353 support from Andrew Carnegie, 357-358 support from leading academics of the day, 366-367 survival of the fittest (Spencer), 353 Terman's work on IQ tests, 363 use of IQ testing to promote discrimination, 362-363 Victims of Eugenics Sterilization Compensation Program (Virginia, 2015), 362 views of Herbert Spencer, 353

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 403

views of Madison Grant, 356 Virginia Sterilization Act of 1924, 360-362 euploidy, 378 Evans, Martin J., 111 evocative genotype-environment correlation, 378 evolution, 378 behavior as a driving force, 5 role in behavioral differences, 4 shared evolutionary history across species, 5, 17 - 19theory of, 5 exercise, 378 candidate gene association studies for physical activity, 298-299 definition of, 296 definition of physical activity, 296 effects of the endocannabinoid system, 300-301 energy balance, 281 evolution of sedentary lifestyles, 279-281 familial association with physical activity, 297-298 genome-wide association studies for physical activity, 299-300 health benefits of regular physical activity, 297 heritability estimates for physical activity, 297-298 leptin-deficient mice, 300 rates of insufficient physical activity, 297-298 recommended levels for health, 297 reinforcing effect of "runner's high", 300-301 thrifty genotype hypothesis, 296 voluntary physical activity in rodents, 300-301 exocytosis, 378 exons, 82, 378 extermination camps, 379 externalizing behavior, 379 externalizing disorders, 200 externalizing psychopathology, 264 F₁ (first filial generation), 31 F₂ (second filial generation), 31 familial inheritance autosomal dominant inheritance pattern, 42-43 autosomal recessive inheritance pattern, 43-44 linkage studies, 107-108 rare single-gene disorders in humans, 42-44 use of pedigrees, 42-44 X-linked dominant inheritance pattern, 43 X-linked recessive inheritance pattern, 44

familial obesity, 287 familial resemblance, 379 contribution of genetic variance, 52-53 historical awareness of, 3-4 work of Francis Galton, 5-6 family history measures of, 262-263 fear, 379 behaviors associated with, 223-225 defensive circuits provide information about potential threats, 223 defensive response to threat, 222-223 definition of, 222-223 effects of domestication, 228-229 genetics of fear and anxiety in mice, 225-226 research paradigms, 223-225 role of HPA axis components, 227-228 role of the GABA neurotransmitter system, 226-227 role of the serotonin transporter system, 227 fear conditioning, 213, 379 fear-related disorders anxiety- and fear-related disorders (ICD-11), 232 feeblemindedness, 379 feeding or eating disorders. See eating disorders first filial (F₁) generation, 379 Fisher, R. A., 355 polygenic inheritance model, 46-47 Five Factor Model of personality traits, 229 five-trial habituation-dishabituation test, 316, 379 fluoxetine, 137 fluvoxamine, 137 FMR1 gene mutation in Fragile X syndrome, 172-173 trinucleotide repeats, 173 triplet repeat expansions, 173-174 forced sterilization, 67 forced swim test, 11, 49-50, 213, 379 depression-like behavior in rats, 63-64 forensic DNA phenotyping, 341, 379 Fragile X syndrome, 172-174, 379 comorbidities, 174 FMR1 gene mutation, 172-173 pattern of inheritance, 172-173 trinucleotide repeats in the FMR1 gene, 173 triplet repeat expansions in the FMR1 gene, 173-174 frameshift mutations, 101, 379

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

404 Index

Franklin, Rosalind, 78 fraternal twins, 379 Friedreich's ataxia, 174 fruit fly (Drosophila melanogaster), 8-9, 16, 18, 73 aggressive behavior, 325 Bloomington Drosophila Stock Center, 41-42 courtship behavior, 321-322 doubling of X-linked gene transcription in males, 87 dunce mutation, 183 genome, 94-95 mapping relative positions of genes on chromosomes, 36-41 mutagenesis using ethyl methanesulfonate (EMS), 110 mutagenesis using transposable elements (transposons), 110 mutations affecting learning and memory, 183 - 184role of heredity in alcohol-related behavior, 261-262 rutabaga mutation, 183 sex-linked white eye mutation, 37-38 shared biology with humans, 17-19 testing learning and memory, 182 X-ray mutagenesis, 110 full agonists, 136, 379 full mutation, 379 functional magnetic resonance imaging (fMRI), 133, 196-198, 379 GABA neurotransmitter system role in fear and anxiety, 226-227 Galton, Francis, 5-6, 8, 11, 25, 230, 358, 363, 366 support for eugenics in England, 355 theory of eugenics, 354-355 gametes, 73, 379 producing haploid gametes by meiosis, 74-76 garden pea (Pisum sativum) Mendel's choice for hybridization experiments, 30-32 Gaucher disease, 119 gel electrophoresis, 104-105, 379 gene editing CRISPR-Cas9 technique, 111-112 gene expression, 379 altered gene expression caused by mutations, 101 effects of life experiences, 88

influence of epigenetic processes, 85-88 process of constructing proteins, 81-84 general cognitive ability, 379 generalized anxiety disorder, 232 generalize (findings), 379 generation, 379 animalculist view, 26-27 early thinking on, 26-28 focus in nineteenth-century farming, 25-26 ovist view, 26-27 preformationist theory, 26-27 qualitative versus quantitative traits, 27 sheep breeding strategies in the eighteenth and nineteenth centuries, 28 view that heredity derives from only one parent, 26-27 genes, 379 avoiding oversimplification of effects of genetic variation, 15 conceptualizing a gene, 89-92 defined by function, 91-92 defined by phenotype, 90 epigenetic marks, 87 for behaviors, 90 identifying gene-behavior associations, 14-15 imprinting (parent-of-origin dependent expression), 87-88 mapping relative positions of genes on chromosomes, 36-41 quantitative genetics, 73 role in behavior, 14-15 role of DNA, 77-79 structure and functions of chromosomes, 73-77 genetic architecture, 379 genetic code, 380 how DNA nucleotide bases code for amino acids, 83-84 genetic correlation, 380 genetic determinism, 380 lack of scientific support for, 67 genetic differences testing for, 11-15 genetic disorders genetic mapping of Mendelian traits in humans, 42-44 genetic effect, 380 genetic engineering germline genetic changes, 344 homologous recombination technique, 111

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 405

humans. 343-345 knockout and knock-in mutations, 111 somatic cell genetic changes, 344 genetic essentialism, 380 avoiding, 66-67 genetic genealogy, 340-341, 380 Genetic Information Nondiscrimination Act of 2008, 336 genetic markers, 107-108, 380 genetic risk, 380 genetic testing, See direct-to-consumer genetic testing genetic variability generation by sexual reproduction, 76 generation during meiosis, 74-76 genetic variance, 380 additive variance, 52 contribution to phenotypic variance, 48-51 dominance variance, 52-53 heritability, 58-59 interaction variance (epistasis), 52-53 non-additive genetic variance, 53 sources of, 52-53 genetic variation altered amino acid sequences, 100-101 altered gene expression or splicing caused by mutations, 101 aneuploidy, 99 copy number variants, 98 de novo mutations, 95 effects of differences in brain structure, 132 - 135effects on neural activation patterns, 131-135 frameshift mutations, 101 genes for formation and maintenance of synapses, 126-131 Genome Data Viewer (NCBI), 97-98 genome-wide association studies (GWAS), 109 genomes, 94-95 impact on brain development and function, 126 - 128indels (insertion/deletion), 98-99 inversions, 99 large deletions, 99 missense mutations, 100 mobile element insertions (MEIs), 99 moderation of drug effects on neural activity, 138 - 140mouse models of neurotransmission, 131-132

neural components, 122-126 nonsense mutations, 101 potential mechanisms of synaptopathology, 126-128 role in evolution, 94 role in phenotype differences, 99-101 role of convergent evidence in understanding, 101 serotonin receptor genetics, 124-126 silent mutations, 100 SNPs (single nucleotide polymorphisms), 95-96 structural variants, 98-99 types of, 94-99 genetic variation measurement, 102-107 candidate gene association studies, 108 components used in molecular genetics, 102-103 copy number variants, 106-107 DNA sequencing, 103-105 effects of population stratification on statistical associations, 109-110 experimental methods, 110-112 genetic markers, 107-108 indels (insertion/deletion), 106-107 limitations of research methods, 109-110 linkage analysis, 107-108 methods for generating genetic variation (mutagenesis), 110-112 microarray methods, 106-107 non-experimental methods, 107-110 polygenic risk scores, 108 polymerase chain reaction (PCR), 105-107 quantitative trait loci (QTL) studies, 108 SNPs (single nucleotide polymorphisms), 106-107 testing associations between genetic variants and behavior, 107-110 using familial inheritance patterns, 107-108 Genome Data Viewer (NCBI), 97-98 genomes, 94-95, 380 cost of sequencing, 114 Human Genome Project, 113-115 mitochondrial genome, 94 nuclear genome, 94 online genomics databases, 97-98 species important in behavior genetics, 95 twins, 95 genome-wide association studies (GWAS), 109, 380

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

406 Index

genotype-environment correlations, 56-58, 380 active correlations, 57 evocative correlations, 57 passive correlations, 56-57 genotype-environment interaction, 54-56 crossover interaction, 54-56 genotypes, 33-34, 380 influence of environmental context, 54-56 genotyping, 140 germ cells, 73, 380 germline cells, 380 germ-plasm, 380 ghrelin, 380 role in appetite stimulation, 287-288 Goddard, Henry H., 172, 356-357, 363 Golden Gate Killer (Joseph James DeAngelo, Jr.), 341 Golgi apparatus, 380 Grant, Madison, 356, 364 Griffith, Frederick, 77 guanine, 79 G×E interaction, 380 Hall, G. Stanley, 363 haploid (n), 380 haplotype block, 317, 380 Harriman, Mary, 358 health risk reports direct-to-consumer genetic testing, 333 helicase, 80, 380 hemizygous, 44, 380 heredity early thinking on generation, 26-28 focus on generation in nineteenth-century farming, 25-26 preformationist theory, 26-27 qualitative versus quantitative traits, 27 sheep breeding strategies in the eighteenth and nineteenth centuries, 28 state of knowledge in the nineteenth century, 25 - 26heritability, 58-59 broad sense heritability, 58 narrow sense heritability, 58 realized heritability, 63, 65 understanding that traits are not inherited, 66 heritability estimation avoiding genetic essentialism, 66-67 in selective breeding of livestock, 60 lack of support for genetic determinism, 67

methods, 59-64 potential for misunderstanding and bias, 66-67 twin studies to estimate in humans, 61-62 use of phenotypic similarity and genetic relatedness, 59-60 using adoption studies to estimate in humans, 63 using selective breeding, 63-64 heritable, 380 Hershey, Alfred, 78 heterochromatin, 86, 381 heteromeric, 381 heterozygosity, 49, 381 heterozygous genotypes, 33, 381 Hirsch, Jerry, 41 histones, 81, 86-87, 381 history of behavior genetics awareness of familial resemblance, 3-4 behavior as a driving force of evolution, 5 blank-slate view of John Locke, 4 contribution of Francis Galton, 5-6 dog breeding for certain traits, 6-8 establishment of behavior genetics in the twentieth century, 8-9 eugenics, 6, 8-9 evolutionary view of Charles Darwin, 4 familial resemblance, 5-6 influence of Gregor Mendel, 8-9 lessons from, 3 nature-versus-nurture debate, 4-6 origins of the field, 3 scientific racism, 8-9 theory of evolution, 5 twin studies, 6 use of non-human animal models, 5, 9 work of Thomas Hunt Morgan, 8 hoarding disorder, 237 Holmes, Oliver Wendell, Jr., 361 Holocaust, 67 homeostasis, 381 homeostatic neuroadaptation, 381 homologous chromosomes, 381 homologous pair, 381 homologous recombination, 111, 381 non-allelic, 313-314 homomeric, 381 homosexual behavior changing views on, 170 homozygosity, 49

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

homozygous genotypes, 33, 381 homunculus, 27 honeybee (Apis mellifera), 9, 18 aggressive behavior, 325 genome, 94-95 Human Genome Epidemiology (HuGE) Navigator, 269 Human Genome Project, 42 impact on biomedical research and technology, 113-115 humanized mouse lines, 111, 381 humans (Homo sapiens) genes associated with violence and aggression in humans, 326 genome of, 95 human genetic engineering, 343-345 human karyotype, 74 sex determination, 323 sexual orientation, 323 Huntington's disease, 43, 119, 174 hybrid cross, 31, 381 hyperphagia, 381 hyperpolarizing input, 381 hypochondriasis, 237 hypofrontality, 381 hypomanic episode, 381 hypothalamic-pituitary-adrenal (HPA) axis role in fear and anxiety, 227-228 role in stress and depression, 215-216 role in the stress response, 88, 223 hypothalamus role in response to threats, 223

```
ICD-11, 149
ICD-11 diagnosis
      alcohol dependence, 253
      anorexia nervosa, 292
      anxiety and fear-related disorders, 232
      autism spectrum disorder, 319
      Bipolar type I, 202
      bulimia nervosa, 292-293
      dementia due to Alzheimer disease, 185
      depressive disorders, 204
      developmental learning disorder, 177
      disorders of intellectual development, 171
      disorders specifically associated with stress,
             240-241
      feeding or eating disorders, 290
      obsessive-compulsive or related disorders, 237
      schizophrenia, 154-155
```

identical twins. 381 imprinted inactivation, 381 inbred strains, 49, 381 increasing alleles, 47, 381 indels (insertion/deletion), 98-99, 381 detection and measurement, 106-107 individual differences. 381 among school children, 169 combination of genetic and environmental variations, 12-15 contribution of genetic variance, 52-53 focus of behavior genetics, 9-10 population thinking (diversity approach), 12-13 testing for genetic differences, 11-15 typological thinking (categorical approach), 12 - 13industrial revolution, 352, 381 inebriometer, 261, 381 Institutional Animal Care and Use Committees (IACUCs), 20-21, 382 Institutional Review Boards (IRBs), 21-22, 382 intellectual disability, 382 developmental disorder with multiple causes, 171-176 disorders of intellectual development (ICD-11), 171 DSM-5 definition, 171 environmental and genetic causes, 172-176 Fragile X syndrome, 172–174 learning disorders not considered as, 177-178 mouse models of Trisomy 21, 175-176 prevalence of, 172 previous terminology for, 172 Trisomy 21 (Down syndrome), 174-176 intelligence, 382 changing views on what is normal, 170-171 defining, 169 standardization of IQ tests, 169-170 testing, 169-170 intelligence quotient (IQ), 382 See also IQ interaction genetic variance (epistasis), 52-53 interaction variance, 382 intergenerational modification, 382 intermediate allele, 382 intermediate phenotypes, 152, 382 internalizing behavior, 382 internalizing disorders, 200

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

408 Index

International Classification of Diseases, 382 See also ICD International Human Genome Sequencing Consortium, 113 interoception, 382 introns, 82, 382 inverse agonists, 136, 382 inversions in chromosomes, 99, 382 ionotropic receptors, 382 ions, 120, 382 IO testing use by eugenicists to promote discrimination, 362-363 use by the US Army, 362-363 IQ tests standardization of, 169-170 isoforms, 382 isogenic lines, 382 isogenic strains, 49 Jensen, Arthur, 368 justice system DNA fingerprinting, 340 DNA profiles, 340 forensic DNA phenotyping, 341 identification of the Golden Gate Killer (Joseph James DeAngelo, Jr.), 341 use of genetic information in the courtroom, 342 using genetic genealogy to identify suspects, 340-341 karyotypes, 382 human karyotype, 74 KIBRA protein role in memory formation, 180-182 Klinefelter syndrome, 312 knockout and knock-in mutations, 111 large deletions, 99, 382 late onset Alzheimer disease (LOAD), 382 Laughlin, Harry H., 358-361, 363-364 Law of Independent Assortment, 382 Law of Segregation, 382 learning changing views on what is normal, 46-48 defining intelligence, 169 individual differences among school children, 169

intelligence testing, 169-170 learning and memory mutations in Drosophila melanogaster, 183-184 testing learning and memory in Drosophila melanogaster, 182 learning disorders developmental learning disorder (ICD-11), 177 dyscalculia, 177 dysgraphia, 177 dyslexia, 177 dyslexia and genes involved in neuronal migration, 178 non-human animal models of dyslexia, 178 not considered intellectual disability, 177-178 specific learning disorder (DSM-5), 177 Lebensborn Program, 382 leptin, 383 leptin-deficient mice, 300 levels in people with Prader-Willi syndrome, 287 obesity in mice with defective leptin signaling, 281-283 role in appetite control, 281-283 level of analysis, 383 levels of analysis, 13-15, 383 Lexapro, 137 life experiences effects on gene expression, 88 lifetime prevalence, 383 light-dark box, 224, 383 linkage, 38-41, 383 linkage analysis, 107-108, 383 linkage groups, 37 liver ethanol metabolism, 265 Locke, John, 4 locus, 383 longitudinal studies, 383 loss, 383 Lutz, Frank, 37 Luvox, 137 lysosomal storage disorders, 119 lysosomes, 383 magnetic resonance imaging (MRI), 133, 383 major allele, 383 Malthus, Thomas, 352-353 manic episode, 383 map distance, 383

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 409

maternal care, 383 mean, 383 measurement error environmental variance caused by, 53-54 measuring behavior forced swim test for rodents. 11 measures used for humans, 10 measures used for non-human animals, 10 methods used for humans, 10-11 methods used for non-human animals, 11 reliable and valid measures, 10-11 resident-intruder test for rodents, 11 running wheel for rodents, 11 self-report measures, 10 meiosis, 383 producing haploid gametes, 74-76 recombination (crossing over) during, 75-76 meiosis I, 383 meiosis II, 383 membranes, 383 memory declarative memories, 179 episodic memories, 179 learning and memory mutations in Drosophila melanogaster, 183-184 role in cognitive ability, 179-180 semantic memories, 179 testing learning and memory in Drosophila melanogaster, 182 types of, 179-180 working memory, 180 memory dysfunction causes of, 179 impairment and distress caused by, 180 post-traumatic stress disorder (PTSD), 180 testing episodic memory, 180 See also Alzheimer disease memory formation role of the KIBRA protein, 180-182 Mendel, Johann (Gregor), 25, 29, 73 choice of the garden pea (Pisum sativum) for hybridization experiments, 30-32 dihybrid cross, 35-36 dominant traits, 32-33 early life and health problems, 29 experimental hybridization work, 30-32 influence on behavior genetics, 8-9 interest in understanding the mechanism of heredity, 30-32

Law of Independent Assortment (inheritance at multiple loci), 35-36 Law of Segregation (inheritance at a single locus), 32-34 life as an Augustinian monk, 29-30 monohybrid cross, 32-34 recessive traits, 32-33 rediscovery of his work in 1900, 354 success and failure at teaching, 30 theoretical model of particulate inheritance, 33-34 Mendelian genetics crossover events during gamete formation, 39-41 linkage, 38-41 mapping relative positions of genes on chromosomes, 36-41 recombinant types, 38-41 Mendelian inheritance autosomal dominant inheritance pattern, 42-43 autosomal recessive inheritance pattern, 43-44 chromosomes as the physical basis of, 73 mapping of genetic disorders in humans, 42-44 normal distribution of a trait within a population, 46-48 polygenic inheritance model, 46-47 problem of dimensional (quantitative) traits, 46-48 use of pedigrees, 42-44 X-linked dominant inheritance pattern, 43 X-linked recessive inheritance pattern, 44 Mendelians, 46, 383 mental health services, 146-147, 383 mental illness, 383 behavior genetic research, 145 behavior genetic research approach, 149-153 characteristics of, 145 comorbidity, 145 diagnostic systems, 149-150 diathesis-stress model, 148 differential sensitivity hypothesis, 148-149 disability-adjusted life years (DALYs), 145-147 emotion dysfunction and, 201 endophenotypes, 151-153 environmental risk and protective factors, 147 - 148genetic correlation across psychiatric disorders, 202-203

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

410 Index

mental illness (cont.) genetic risk and protective factors, 147 levels of analysis of genetic effects, 150-151 negative impacts on length and quality of life, 145 - 146potential mechanisms of synaptopathology, 126-128 prevalence of, 145 Research Domain Criteria (RDoC), 151-153 risk factors for, 147-149 treatments provided by mental health services, 146 - 147variation in genes for serotonin synthesis and metabolism, 123-124 mental retardation, 384 messenger RNA. See mRNA meta-analysis, 384 metabotropic receptors, 384 methylation and demethylation of DNA, 86-87 Michigan Longitudinal Study (MLS), 263 microarray methods, 106-107 mid-parent value, 384 Miescher, Friedrich, 77 Milgram's Obedience Study, 21 Million Veteran Program, 235-236 minor allele, 384 miscegenation, 384 missense mutations, 100, 384 missing heritability, 384 mitochondria, 119, 384 mitochondrial DNA, 119 mitochondrial genome, 94, 384 mitosis, 384 producing diploid cells, 76-77 mobile element insertions (MEIs), 99, 384 molecular genetics basic components used in, 102-103 DNA collection and processing, 102 DNA polymerase, 102-103 DNA sequencing, 103-105 gel electrophoresis, 104-105 nucleotides (dNTPs), 103 oligonucleotide primers, 102-103 oligonucleotide probes, 103 polymerase chain reaction (PCR), 105-107 schizophrenia, 159-163 Tag polymerase, 102 molecular mechanisms, 384 pathways from gene to behavior, 14-15

molecules of heredity, 73 monkeys use in behavior genetics studies, 9 monoamine hypothesis of depression, 211, 384 monoamine oxidase inhibitors (MAOIs), 137, 384 monoamines. 384 monohybrid cross, 31-32, 384 Mendel's classic experiments, 32-34 Punnett square, 33-34 monosomy, 99, 384 monozygotic twins (MZ), 384 mood disorders, 201 ICD-11 diagnosis, 201 Morgan, Thomas Hunt, 8, 36-41, 73, 110 morphological feature, 384 mosaicism, 384 mouse (Mus musculus), 9, 18 aggressive behavior, 325 behaviors studied in, 51 description, 51 development of knockout lines, 111 forced swim test for depression-like behavior, 49_{-50} genetics, 51 genetics of fear and anxiety, 225-226 genome, 94-95 humanized mouse lines, 111 partitioning trait variance, 49-50 shared biology with humans, 17-19 mouse (Mus musculus) models alcohol use disorder, 261 Alzheimer disease, 189 knockout model of obsessive-compulsive disorder, 239-240 neurotransmission, 131-132 obesity related to defective leptin signaling, 281-283 oxytocin knockout mice, 315-316 serotonin system genes knockout mice, 324-325 serotonin transporter (SERT) knockout, 132 serotonin transporter gene Slc6a4 knockout mice, 215 transgenerational epigenetic inheritance, 89 Trisomy 21, 175–176 mRNA, 384 processing of the primary transcript, 73-81 transcription of DNA, 73-81 translation into proteins, 82-84

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 411

mRNA vaccines for COVID-19, 115 Muller, Herman J., 110 multiple comparisons, 384 mutagenesis, 17, 110, 384 conditional knockout techniques, 111 CRISPR-Cas9 technique, 111-112 ethyl methanesulfonate (EMS), 110 homologous recombination technique, 111 knockout and knock-in mutations, 111 methods for generating genetic variation, 110-112 transposable elements (transposons), 110 X-ray mutagenesis in Drosophila melanogaster, 110 mutations altered gene expression or splicing caused by, 101 frameshift mutations, 101 missense mutations, 100 nonsense mutations, 101 point mutations, 110 private damaging mutations, 162-163 silent mutations, 100 Napp, Cyrill, 29-30 narrow sense heritability, 384 National Center for Biotechnology Information (NCBI) ClinVar database, 332 Genome Data Viewer, 97-98 National Center for Human Genome Research, 113 National Epidemiologic Survey on Alcohol and Related Conditions III, 249 National Human Genome Research Institute, 114 National Survey on Drug Use and Health (NSDUH), 249 natural, 385 natural selection, 5, 385 nature-versus-nurture debate, 4, 385 work of Francis Galton, 5-6 Nazi Germany, 67 breeding more Aryans (Lebensborn Program), 365-366 concentration camps, 364-365 eugenics policy inspired by the United States, 364-366 experimentation on concentration camp prisoners, 21 extermination camps, 365 forced sterilization laws, 364

Hitler's inspiration from American eugenics, 364-365 Nuremberg Laws on race, 367 negative symptoms, 385 negatively reinforcing behavior, 385 neural activation patterns effects of genetic variation, 131-135 neural activity drug effects moderated by genetic variations, 138 - 140neural activity patterns, 385 neural function impacts of drugs on, 136-137 neurexins, 127-128, 385 neuroadaptation, 131-132, 385 neurodegenerative diseases, 119 neuroendocrine cells, 385 neurogenesis, 126, 385 neuroimaging genetics, 133-134 functional magnetic resonance imaging (fMRI), 133 magnetic resonance imaging (MRI), 133 positron emission tomography (PET), 133 neurolaw, 385 neuroligins, 127-128, 385 neurological function impact of genetic variation during brain development, 126-128 neurons, 385 action potential, 121 activity underlying behavior, 117 axon, 120 basic cellular functions, 117-119 basic structure of an interneuron, 120 cell cytoplasm, 117 cell membrane, 117-118 cell nucleus, 119 cell organelles, 117 communication process, 120 dendrites, 120 diffusion pressure, 121 electrostatic pressure, 121 genes for formation and maintenance of synapses, 126-131 genetic variation in neural components, 122-126 genetic variation in neurotransmitter binding at synapses, 128-131 Golgi apparatus, 119 interneurons, 120

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

412 Index

neurons (cont.) ion channels, 121 lysosomes, 119 mitochondria, 119 motor neurons, 120 movement of ions during neurotransmission, 120 - 121neuroadaptation, 131 neurotransmitter receptors, 120 perikaryon, 120 potential mechanisms of synaptopathology, 126 - 128receiving and transmitting information, 119-121 resting potential, 120-121 rough endoplasmic reticulum, 119 sensory neurons, 120 serotonin synthesis and metabolism pathway, 123-124 similarities across the animal kingdom, 120 smooth endoplasmic reticulum, 119 synapse, 120 synaptic activity, 121-122 types of, 120 neuroticism personality trait, 196, 385 candidate gene associations studies and GWAS, 230-231 heritability estimates, 229-230 heritability of, 199 study of genetic differences in anxiety, 229-231 neurotransmission effects of genetic differences in brain structure, 132-135 mouse models of genetic effects, 131-132 neurotransmitter receptors, 120 serotonin receptor genetics, 124-126 neurotransmitter systems, 122-123 neurotransmitters, 120, 385 genetic variation in binding to receptors at synapses, 128-131 Next generation sequencing, 385 niche specialization, 5, 385 non-additive genetic variance, 53, 385 non-allelic homologous recombination, 313-314 non-conservative mutations, 385 non-human animal models, 385 alcohol use disorder, 257-262 Alzheimer disease, 5 behavioral measures, 10-11 consideration in convergent evidence, 16

contribution to human well-being, 16 controlled matings, 16-17 depression, 212-216 dyslexia, 178 essential role in behavior genetics, 16-20 ethical oversight of research, 20-21 ethics of using animals for research, 19 fear-conditioning paradigm, 213 forced swim test, 213 limitations of, 19-20 model organisms, 17-18 mutagenesis, 17 problem of generalization from one species to another, 19-20 PTSD, 243 range of animals used in behavior genetics, 8-9 recombinant inbred lines, 259-261 schizophrenia genetic models, 42, 163-164 shared evolutionary history across species, 5, 17-19 shock avoidance paradigm, 213 similarity of dog and human diseases, 8 tail suspension test, 213 two-bottle choice test, 214 where ethical issues prevent using human subjects, 16-17 See also particular species nonsense mutations, 101, 385 non-shared environmental factors, 385 non-sister chromatids, 385 non-synonymous mutations, See missense mutations normal, 385 changing definitions of, 170-171 normal distribution, 385 polygenic inheritance model, 46-48 norms, 386 NRG1 gene schizophrenia studies, 164 nuclear genome, 386 nucleic acids discovery of, 77 nucleus, 386 Nuremberg Laws, 386 nutrition transition, 386 obesity, 386

body mass index (BMI) and, 284–285 burden of disease, 287 candidate genes associated with, 288–289 contributing factors, 287

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 413

familial obesity, 287 health impacts, 287 in mice with defective leptin signaling, 281-283 in Prader-Willi syndrome, 287-288 rates of. 284 susceptibility to, 279-281 syndromic obesity, 287-288 obesogenic environments, 386 obsessions, 386 obsessive-compulsive disorder, 203 candidate gene association studies, 238-239 characteristics of, 237 early onset form, 238 familial inheritance, 237-238 genome-wide association studies, 239 heritability estimate, 238 ICD-11 diagnosis, 237 knockout mouse model, 239-240 olfactory reference disorder, 237 oligonucleotide primers, 102-103 oligonucleotide probes, 103 oligonucleotides, 386 one drop rule, 386 operational definition, 386 organelles, 386 outbred strains, 49, 386 ovists, 26-27, 386 oxytocin, 386 role in affiliation and attachment, 314-319 variation in genes for, 315-316 oxytocin knockout mice, 316 oxytocin system variants as candidate genes, 316-317 pangenesis, 386 Parabon Nanolabs, 341 parasympathetic nervous system, 223, 386 parental generation, 386

parental generation, parental types, 39, paroxetine, 137 partial agonists, 136, passive genotype–environment correlation, paternal care, Paxil, 137 Pearson, Karl, 46, 355 pedigrees, 42–44, penetrance, pentameric protein, perikaryon, personality traits Big Five, 229 heritability of neuroticism trait, 199 neuroticism, 196 pharmacodynamics, 136-137, 386 pharmacogenetic reports direct-to-consumer genetic testing, 333-334 pharmacogenetics, 136, 138-140, 386 pharmacogenomics, 138, 140, 386 pharmacokinetics, 136-137, 386 pharmacology, 136, 386 phenotypes, 33-34, 386 forensic DNA phenotyping, 341 role of genetic variation, 99-101 phenotypic variance, 387 genetic and environmental sources of, 48-51 genotype-environment correlations, 56-58 heritability, 58-59 partitioning into genetic and environmental components, 49-50 sources of environmental variance, 53-56 sources of genetic variance, 52-53 phenylketonuria (PKU), 43-44, 368 phospholipid bilayer, 387 physical activity, 296, 387, 387 See also exercise physiological measures, 387 pleiotropy, 160-161, 387 Ploetz, Alfred, 364 point mutations, 387 point prevalence, 387 pollen, 387 polygenes, 73, 387 polygenic inheritance additive genetic variation, 57-58 polygenic inheritance model, 46-47 polygenic risk scores, 108, 387 polymerase chain reaction (PCR), 9, 105-107, 387 population stratification, 387 effects on genetic variation statistical associations, 109-110 population thinking, 12-13, 387 positive symptoms, 387 positively reinforcing behavior, 387 positron emission tomography (PET), 133, 387 post-traumatic stress disorder (PTSD), 180, 241-243 candidate gene association studies, 242 characteristics of, 241 estimates of heritability of risk, 242

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

414 Index

post-traumatic stress disorder (PTSD) (cont.) family and twin studies, 241-242 genome-wide association studies, 242-243 non-human animal models, 243 prevalence of, 241 risk factors and protective factors, 241-242 Prader-Willi syndrome, 88 obesity in people with, 287-288 precision medicine, 337, 387 All of Us study (Precision Medicine Initiative), 337-338 in psychiatry, 338-340 serotonin transporter 5-HTTLPR variants and SSRI response, 339-340 Precision Medicine Initiative, 337-338 preference ratios, 387 preformationist theory, 26-27, 32, 387 premutation, 387 Priddy, Albert, 360-361 primary investigators, 387 primary transcript, 387 primers, 387 private damaging mutations, 162-163, 387 proactive aggression, 387 proband, 388 probes, 388 process model of emotion regulation, 388 proteins, 388 amino acid sequence specified by DNA sequence, 81-84 construction process, 81-84 description and functions of, 81 role of tRNA in protein construction, 82-84 Prozac, 137 Psychiatric Genetics Consortium, 109 Psychiatric Genomics Consortium, 160, 202, 388 Cross-Disorder Group, 203 psychiatry precision medicine, 338-340 psychoactive substances, 248, 250-251, 388 psychopharmacology, 136, 388 pulse song, 388 Punnett square, 33-34, 388 dihybrid cross, 36 purines, 79, 388 pyrimidines, 79, 388 qualitative traits, 27, 31, 388 quantitative genetics, 58, 73

Fisher's polygenic model of inheritance, 46–47 origins of, 46

quantitative trait loci (QTL), 388 quantitative trait loci (QTL) studies, 108 quantitative traits, 27, 31, 388 dominance genetic variance, 52 problem of dimensional traits, 46-48 racial essentialism, 366, 388 racial hygiene, 388 racism, 351, 388 scientific racism, 8-9 rare alleles, 388 rat (Rattus norvegicus), 9, 18 Fawn Hooded (FH) strain, 214 Flinders sensitive line (FSL), 214 genome, 94-95 Learned Helplessness (LH) line, 214 selective breeding for depression-like behavior, 63-64 Wistar-Kyoto (WKY) line, 214 reaction times, 388 reactive aggression, 388 realized heritability, 388 receptor availability, 136, 388 receptor binding affinity, 136 recessive traits, 32-33, 388 reciprocal cross, 31, 388 recombinant inbred lines, 259-261, 389 recombinant types, 38-41, 389 recombination breakpoints, 389 recombination rate, 389 ref SNP, 389 refractory period, 389 regression analysis, 60, 389 reification, 150, 389 reliable measures, 10, 389 RELN gene schizophrenia studies, 164 reproductive strategies influence on parental care, 307 research consortia, 389 Research Domain Criteria (RDoC), 151-153, 206, 295, 314, 389 resident-intruder test, 11, 389 response to selection, 389 resting potential, 389 restriction endonucleases, 106, 389 restriction fragment length polymorphisms (RFLPs), 106, 389 Rett syndrome, 43 reuptake, 389 Revised Stanford-Binet IQ test, 363

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 415

ribonucleic acid. See RNA ribosomes, 84 risk alleles, 108, 389 risk indicators, 389 RNA, 389 discovery of, 77 four bases, 77 RNA polymerase, 81, 389 rough endoplasmic reticulum, 389 roundworm (Caenorhabditis elegans), 9, 16, 18 genome, 94-95 Rüdin, Ernst, 364 runner's high, 389 running wheel, 11, 390 sampling bias, 390 Sanger sequencing, 104-105, 390 Satin Bowerbird (Ptilonorhynchus violaceus), 321 schizophrenia, 203 3q29 microdeletion risk factor, 159-160 age of onset, 154 burden of disease, 154 copy number variants risk factor, 159-160 DISC1 gene studies, 164 dopamine hypothesis, 156 DTNBP1 gene studies, 164 endophenotypes, 160-161 enlarged ventricles associated with, 155-156 environmental risk factors, 158 heritability, 157-159 hypofrontality associated with, 156 ICD-11 diagnosis, 154-155 in populations with African ancestry, 162-163 molecular genetics, 159-163 neurobiological features associated with, 155-156 non-human animal genetic models, 163-164 NRG1 gene studies, 164 pleiotropy among associated genes, 160-161 polygenic risk score, 161 polygenic trait, 159 positive and negative symptoms, 155 prevalence, 154 private damaging mutations, 162-163 RELN gene studies, 164 risk associated with familial relatedness, 157-159 symptom heterogeneity, 155 symptoms, 154-155 treatment, 154

scientific racism. 8-9. 352-353. 390 sedentary behavior, 390 selection differential, 390 selective breeding, 390 depression-like behavior in rats, 63-64 dog breeding for certain traits, 6-8 domestication syndrome, 228-229 using to estimate heritability, 63-64 selective breeding of livestock use of heritability estimation, 60 selective permeability, 390 selective serotonin reuptake inhibitors. See SSRIs self-report measures, 10, 390 semantic memories, 179, 390 semiconservative replication, 80, 390 sense strand of DNA, 81, 390 sensitivity alleles, 390 serotonergic system, 122-123 serotonin variation in genes that code for synthesis and metabolism, 123-124 serotonin receptor 5-HT1B genetic variation in neurotransmitter binding at synapses, 128-131 serotonin receptor 5-HTR1A, 134-135 serotonin receptor 5-HTR2C, 139 serotonin receptor genetics, 124-126 serotonin transporter (SERT) mouse knockout models, 132 serotonin transporter 5-HTTLPR variants, 138-139 anxiety and, 230-231 effects on SSRI response, 339-340 role in depressive disorders, 208-210 role in individual differences in SSRI response, 212 serotonin transporter gene Slc6a4 knockout mice, 215 serotonin transporter system role in fear and anxiety, 227 sertraline, 137 sex chromosome number impact of alterations on social cognition, 312 sex chromosomes, 73, 390 sex determination in humans, 323 sex-linked inheritance white eye mutation in fruit flies, 37-38 sex-linked phenotype, 390 sexual behavior circuits, 320-323 sexual orientation in humans, 323, 390 sexual reproduction generation of genetic variability, 76

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

416 Index

sexual selection, 320-323, 390 courtship in Drosophila melanogaster, 321-322 Shakespeare, William, 4 shared environmental factors, 391 sheep Bakewell's New Leicester sheep (New Dishley sheep), 28 breeding strategies in the eighteenth and nineteenth centuries, 28 shock avoidance, 391 Shockley, William, 367-368 sickle cell anemia, 333 silent mutations, 100, 391 silver fox (Vulpes vulpes) domestication study, 228-229 sine song, 391 single nucleotide polymorphisms. See SNPs sister chromatids, 391 Smithies, Oliver, 111 smooth endoplasmic reticulum, 391 SNP heritability, 391 SNPs (single nucleotide polymorphisms), 95-96, 391 detection and identification, 106-107 heritability estimates, 198-199 missing heritability problem, 198-199 sociability, 391 definition of, 311 genetic variation and individual differences, 311-314 people with Williams syndrome, 312-314 social behavior, 391 affiliation and attachment, 314-319 agonistic behavior, 308-309 attachment styles, 308 brain circuits involved in, 310 caregiving, 306-308 challenge of studying the effects of genetic variation, 306 courtship behavior, 308 deficits associated with autism spectrum disorder, 319 definition of, 306 development in childhood, 307-308 dominance hierarchies, 308 dynamically reciprocal nature, 309-310 effects of childhood maltreatment, 307-308 genetic variation and individual differences in social cognition, 311-314

influence of reproductive strategies, 307 neurobiology of, 309-310 parental care, 306-308 role of oxytocin, 314-319 social cognition, 308 social cognition, 308, 391 genetic variation and individual differences, 311-314 impact of sex chromosome number alterations, 312 people with Turner syndrome, 311-312 Social Darwinism, 351-353, 391 social desirability, 391 social psychology, 306, 308 social recognition memory, 316, 391 sodium potassium pump, 391 somatic gene edits, 391 specific learning disorder (DSM-5), 177, 391 Spencer, Herbert, 353, 363 spliced mRNA, 391 SSRIs (selective serotonin reuptake inhibitors), 137-139, 208, 211-212, 390 influence of 5-HTTLPR variants on response to, 339-340 stabilizing selection, 324, 391 standard deviation, 391 Stanford Prison Experiment, 21 Stanford-Binet Intelligence Scales, 363 statistics, 46, 58 stigma (of a plant), 391 stop codons, 391 stress-related disorders, 240-241 disorders specifically associated with stress (ICD-11), 240-241 post-traumatic stress disorder (PTSD), 241-243 stress response effects of maternal behavior in early life, 88 role of the HPA axis, 88 stressors, 392 strong genetic explanation, 392 Sturtevant, Alfred H., 41 subjective mental state, 392 Sutton, Walter S., 73 sympathetic nervous system, 223, 392 symptom heterogeneity, 392 synapses, 392 genes for formation and maintenance of, 126-131

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

Index 417

genetic variation in binding of neurotransmitters, 128-131 potential mechanisms of synaptopathology, 126-128 synaptic cell adhesion molecules, 127-128, 392 synaptic integrity, 392 synaptogenesis, 126, 392 synaptopathology, 392 syndromic obesity, 392 synonymous mutations, See silent mutations synteny, 392 tail suspension test, 213, 392 Taq polymerase, 102, 392 target sample, 392 Tay-Sachs disease, 333 Terman, Lewis M., 363 The Institute for Genomic Research (TIGR), 113 thermalcyclers, 102, 392 Thermus aquaticus source of Taq polymerase, 102 thrifty genotype hypothesis, 279-281, 296, 392 thymine, 79 tolerance, 392 Tolman, Edward Chace, 8 Tourette syndrome, 203 transcription factors, 81, 392 transgenerational epigenetic inheritance, 88-89, 392 transgenic organisms, 392 translation, 392 transporter proteins, 392 transposable elements (transposons), 110 trauma, 392 trauma-related disorders, 240-241 disorders specifically associated with stress (ICD-11), 240-241 post-traumatic stress disorder (PTSD), 241-243 tricyclic antidepressants, 211 trihybrid backcrosses, 41 trinucleotide repeats, 393 triplet repeat expansions, 393 FMR1 gene, 173-174 trisomy, 99, 393 Trisomy 21, 99, 174-176, 393 characteristics of, 174-175 dementia risk, 174-175 incidence, 174 mouse models, 175-176

risk factor for Alzheimer disease, 185-187 trisomy X, 312 tRNA (transfer RNA), 392 role in constructing proteins, 82-84 Trut, Lyudmila, 228 Tryon, Robert Choate, 8 Turner syndrome, 99 impact on social cognition, 311–312 Tuskegee Syphilis Experiment, 21 twin studies, 393 equal environment assumption, 62 estimating heritability in humans, 61-62 heritability of neuroticism, 196 types of twins, 61 work of Francis Galton, 6 twins genomes, 95 two-bottle choice test, 214, 257, 393 typological thinking, 12-13, 393 UBE3A gene, 87 unfolded protein response (UPR) genes, 119 valid measures, 10, 393 variance, 393 definition of, 48-49 partitioning into genetic and environmental components, 49-50 varieties, 31, 393 Venter, Craig, 113 vesicles, 393 Virginia Sterilization Act of 1924, 360-362 Watson, James, 78, 113, 358 weak genetic explanation, 393 weight genetic weight reports, 334-335 weight control, 279 Weldon, W. F. R., 46 wellness reports direct-to-consumer genetic testing, 334-335 wild-type, 37, 393 Wilkins, Maurice, 78 Williams syndrome, 393 sociability, 312-314 Williams syndrome critical region, 393 withdrawal syndromes, 251, 393 working memory, 180, 393

Cambridge University Press 978-1-108-48797-9 — Foundations of Behavior Genetics Scott F. Stoltenberg Index <u>More Information</u>

418 Index

X-chromosome inactivation, 87 X-linked dominant inheritance, 43, **393** X-linked recessive inheritance, 44, **393** X-ray crystallography, 78 X-ray mutagenesis fruit fly (*Drosophila melanogaster*), 110 XYY syndrome, 312 Yerkes, Robert, 362

zebra fish (*Danio rerio*), 9, 18 aggressive behavior, 325 genome, 94–95 Zoloft, 137 zygotes, **393**