

# INDEX

## A

absorption spectrum, 124, 132  
 abyssal zone, 556, 563  
 acellular, 450, 472  
 acetyl CoA, 104, 113  
 acid, 51  
 Acid rain, 547  
 acid rain, 563  
 Acids, 38  
 acoelomate, 395  
 acoelomates, 360  
 Actinopterygii, 387, 395  
 action potential, 432, 440  
 activation energy, 97, 113  
 active immunity, 461, 472  
 active site, 98, 113  
 Active transport, 81  
 active transport, 85  
 adaptation, 253, 270  
 Adaptive immunity, 460  
 adaptive immunity, 472  
 adaptive radiation, 264, 270  
 adhesion, 37, 51  
 adrenal gland, 440  
 adrenal glands, 423  
 Age structure, 512  
 age structure, 525  
 algal bloom, 560, 563  
 allele, 194  
 alleles, 178  
 allergy, 469, 472  
 Allopatric speciation, 262  
 allopatric speciation, 270  
 allosteric inhibition, 100, 113  
 alternation of generations, 155, 170  
 alternative RNA splicing, 219, 220  
 alveoli, 415  
 alveolus, 440  
 amino acid, 51  
 Amino acids, 46  
 amniote, 395  
 amniotes, 389  
 amoebocyte, 395  
 Amoebocytes, 362  
 Amoebozoa, 306, 319  
 Amphibia, 388, 395  
 ampulla of Lorenzini, 395  
 ampullae of Lorenzini, 387  
 amygdala, 437, 440  
 amylase, 409, 440  
 anabolic, 93, 113  
 anaerobic, 292, 319  
 anaerobic cellular respiration, 113  
 analogous structure, 270, 283, 288  
 analogous structures, 253  
 anaphase, 140, 149  
 aneuploid, 165, 170  
 anion, 51  
 anions, 31  
 anneal, 245  
 annealing, 229  
 Annelida, 378, 395  
 anoxic, 292, 319  
 anther, 344, 351  
 Anthophyta, 347, 351  
 Anthropoids, 393  
 anthropoids, 395  
 antibody, 461, 472  
 antigen, 460, 472  
 antigen-presenting cell (APC), 462, 472  
 Anura, 388, 395  
 anus, 411, 440  
 aorta, 417, 440  
 apex consumer, 563  
 apex consumers, 531  
 aphotic zone, 555, 563  
 apical meristem, 329, 351  
 Apoda, 388, 395  
 apoptosis, 453, 472  
 appendicular skeleton, 428, 440  
 applied science, 22, 24  
 Archaeplastida, 306, 319  
 Arctic tundra, 553  
 arctic tundra, 563  
 Arteries, 419  
 artery, 440  
 Arthropoda, 371, 395  
 Ascomycota, 314, 319  
 Asexual reproduction, 478  
 asexual reproduction, 495  
 Asymmetrical, 358  
 asymmetrical, 395  
 atom, 9, 24  
 atomic number, 28, 51  
 ATP, 102, 113  
 ATP synthase, 107, 113  
 atrium, 417, 440  
 attenuation, 455, 472  
 auditory ossicles, 427, 440  
 autoantibody, 470, 472  
 Autoimmunity, 470  
 autoimmunity, 472  
 autonomic nervous system, 437, 440

autosome, 170  
 autosomes, 165  
 autotroph, 118, 132, 563  
 autotrophs, 535  
 axial skeleton, 426, 440  
 axon, 433, 440

## B

B cell, 472  
 B cells, 460  
 Basal angiosperms, 348  
 basal angiosperms, 351  
 basal ganglia, 436, 440  
 base, 51  
 bases, 38  
 Basic science, 22  
 basic science, 24  
 Basidiomycota, 314  
 basidiomycota, 319  
 benthic realm, 555, 563  
 bicuspid valve, 417, 440  
 Bilateral symmetry, 359  
 bilateral symmetry, 395  
 Bile, 410  
 bile, 440  
 binary fission, 145, 149  
 binomial nomenclature, 276, 288  
 biodiversity, 568, 590  
 biodiversity hotspot, 586, 590  
 bioenergetics, 92, 113  
 biofilm, 294, 319  
 biogeochemical cycle, 537, 563  
 Biology, 5  
 biology, 24  
 Biomagnification, 536  
 biomagnification, 563  
 biomarker, 243, 245  
 biome, 531, 563  
 bioremediation, 301, 319  
 biosphere, 12, 24  
 Biotechnology, 225  
 biotechnology, 245  
 birth rate, 505, 525  
 Black Death, 297, 319  
 blastocyst, 483, 495  
 body plan, 356, 395  
 bolus, 409, 440  
 bones, 391  
 boreal forest, 552, 563  
 bottleneck effect, 256, 270  
 botulism, 299, 319  
 brachiation, 393, 395  
 brainstem, 437, 440  
 branch point, 279, 288

bronchi, **415, 440**  
 bronchiole, **440**  
 bronchioles, **415**  
 budding, **363, 395, 495**  
 Budding, **479**  
 buffer, **51**  
 Buffers, **38**  
 bulbourethral gland, **486, 495**  
 Bush meat, **578**  
 bush meat, **590**

## C

caecilian, **395**  
 Caecilians, **389**  
 Calvin cycle, **127, 132**  
 calyx, **344, 351**  
 canopy, **548, 563**  
 capillaries, **419**  
 capillary, **440**  
 capsid, **451, 472**  
 capsule, **295, 319**  
 carbohydrate, **51**  
 Carbohydrates, **40**  
 carbon fixation, **127, 132**  
 cardiac cycle, **418, 440**  
 Cardiac muscle tissue, **430**  
 cardiac muscle tissue, **440**  
 carpel, **344, 351**  
 carrying capacity, **505, 525**  
 cartilaginous joint, **440**  
 Cartilaginous joints, **428**  
 catabolic, **93, 113**  
 cation, **51**  
 cations, **31**  
 cell, **10, 24**  
 cell cycle, **137, 149**  
 cell cycle checkpoints, **142, 149**  
 cell plate, **140, 149**  
 cell wall, **69, 85**  
 cell-mediated immune response, **460, 472**  
 Cellulose, **41**  
 cellulose, **51**  
 central nervous system (CNS), **435, 440**  
 central vacuole, **70, 85**  
 centriole, **149**  
 centrioles, **138**  
 Cephalochordata, **383, 395**  
 cephalothorax, **373, 395**  
 cerebellum, **437, 441**  
 cerebral cortex, **435, 441**  
 cerebrospinal fluid (CSF), **435, 441**  
 chaeta, **395**  
 chaetae, **379**  
 channel, **561, 563**  
 chaparral, **550, 563**  
 chelicerae, **373, 395**  
 chemical bond, **51**  
 chemical bonds, **31**  
 chemical diversity, **569, 590**  
 chemiosmosis, **107, 113**  
 chemoautotroph, **563**  
 chemoautotrophs, **535**  
 chiasmata, **158, 170**  
 chitin, **41, 51, 370, 395**  
 chlorophyll, **120, 132**  
 chlorophyll a, **124, 132**  
 chlorophyll b, **124, 132**  
 chloroplast, **85, 120, 132**  
 Chloroplasts, **69**  
 choanocyte, **362, 395**  
 Chondrichthyes, **386, 395**  
 Chordata, **382, 395**  
 Chromalveolata, **306, 319**  
 chromosome inversion, **168, 170**  
 chyme, **410, 441**  
 chytridiomycosis, **580, 590**  
 Chytridiomycota, **314, 319**  
 cilia, **64**  
 cilium, **85**  
 citric acid cycle, **105, 113**  
 clade, **288**  
 clades, **285**  
 cladistics, **285, 288**  
 class, **276, 288**  
 cleavage furrow, **140, 149**  
 climax community, **524, 525**  
 clitellum, **380, 395**  
 clitoris, **487, 495**  
 cloning, **228, 245**  
 closed circulatory system, **417, 441**  
 club moss, **351**  
 club mosses, **335**  
 Cnidaria, **363, 395**  
 cnidocyte, **395**  
 cnidocytes, **363**  
 codominance, **186, 194**  
 codon, **214, 220**  
 coelom, **360, 395**  
 cohesion, **36, 51**  
 colon, **411, 441**  
 commensalism, **302, 319**  
 community, **12, 24**  
 competitive exclusion principle, **518, 525**  
 competitive inhibition, **99, 113**  
 complement system, **459, 472**

complete digestive system, **370, 396**  
 concentration gradient, **77, 85**  
 cone, **351**  
 cones, **339**  
 conifer, **351**  
 Conifers, **341**  
 conjugation, **296, 319**  
 Continuous variation, **174**  
 continuous variation, **194**  
 control, **20, 24**  
 convergent evolution, **253, 270**  
 coral reef, **563**  
 Coral reefs, **557**  
 corolla, **344, 351**  
 corpus callosum, **435, 441**  
 corpus luteum, **487, 495**  
 cotyledon, **351**  
 cotyledons, **347**  
 covalent bond, **32, 51**  
 craniate, **396**  
 craniates, **385**  
 Crocodilia, **390, 396**  
 crossing over, **158, 170**  
 cryptofauna, **558, 563**  
 ctenidia, **375, 396**  
 cutaneous respiration, **388, 396**  
 cyanobacteria, **292, 319**  
 cycad, **351**  
 Cycads, **341**  
 cytokine, **457, 472**  
 Cytokinesis, **140**  
 cytokinesis, **149**  
 cytopathic, **453, 472**  
 cytoplasm, **63, 85**  
 cytoskeleton, **63, 85**  
 cytosol, **63, 85**  
 cytotoxic T lymphocyte (T<sub>C</sub>), **472**

## D

dead zone, **544, 563**  
 death rate, **505, 525**  
 Deductive reasoning, **19**  
 deductive reasoning, **24**  
 demography, **500, 525**  
 denaturation, **46, 51**  
 dendrite, **441**  
 Dendrites, **432**  
 dendritic cell, **462, 472**  
 density-dependent, **508**  
 density-dependent regulation, **525**  
 density-independent, **508**

density-independent regulation, **525**  
 deoxyribonucleic acid (DNA), **49, 51**  
 deoxyribose, **200, 220**  
 depolarization, **432, 441**  
 Descriptive, **19**  
 descriptive science, **24**  
 desmosome, **85**  
 desmosomes, **72**  
 detrital food web, **534, 563**  
 Deuteromycota, **319**  
 deuterostome, **396**  
 Deuterostomes, **360**  
 diaphragm, **415, 441**  
 diastole, **418, 441**  
 dicot, **351**  
 dicots, **348**  
 Diffusion, **77**  
 diffusion, **85**  
 dihybrid, **183, 194**  
 dioecious, **371, 396**  
 diphyodont, **396**  
 diphyodonts, **392**  
 diploblast, **396**  
 diploblasts, **359**  
 diploid, **136, 149**  
 diploid-dominant, **155, 170**  
 Diplontic, **327**  
 diplontic, **351**  
 disaccharide, **51**  
 Disaccharides, **41**  
 discontinuous variation, **174, 194**  
 dispersal, **263, 270**  
 divergent evolution, **253, 270**  
 DNA ligase, **205, 220**  
 DNA polymerase, **205, 220**  
 domain, **288**  
 domains, **276**  
 Dominant, **177**  
 dominant, **194**  
 dorsal hollow nerve cord, **382, 396**  
 double helix, **201, 220**  
 down feather, **396**  
 down feathers, **391**  
 down-regulation, **422, 441**

## E

Echinodermata, **380, 396**  
 ecosystem, **12, 24, 530, 563**  
 ecosystem diversity, **569, 590**  
 ecosystem services, **560, 563**  
 ectotherm, **441**

ectotherms, **404**  
 effector cell, **472**  
 effector cells, **464**  
 electrocardiogram (ECG), **419, 441**  
 electrochemical gradient, **81, 85**  
 electromagnetic spectrum, **123, 132**  
 electron, **28, 51**  
 electron transfer, **31, 51**  
 electron transport chain, **105, 113**  
 element, **51**  
 elements, **28**  
 Emergent vegetation, **562**  
 emergent vegetation, **563**  
 Endemic species, **571**  
 endemic species, **590**  
 endergonic, **113**  
 endergonic reactions, **96**  
 endocrine gland, **441**  
 endocrine glands, **421**  
 Endocytosis, **82**  
 endocytosis, **85**  
 endomembrane system, **64, 85**  
 endoplasmic reticulum (ER), **65, 85**  
 endosymbiosis, **319**  
 endosymbiotic theory, **303**  
 endotherm, **404, 441**  
 environmental disturbance, **525**  
 environmental disturbances, **523**  
 enzyme, **51, 113**  
 Enzymes, **45**  
 enzymes, **97**  
 epidemic, **319**  
 epidemics, **297**  
 epidermis, **364, 396**  
 epigenetic, **216, 220**  
 epistasis, **192, 194**  
 Equilibrium, **531**  
 equilibrium, **563**  
 esophagus, **408, 441**  
 essential nutrient, **441**  
 essential nutrients, **413**  
 estrogen, **491, 495**  
 Estuaries, **559**  
 estuary, **563**  
 eucoelomate, **396**  
 eucoelomates, **360**  
 eudicots, **347, 351**  
 eukaryote, **24**  
 eukaryotes, **10**  
 eukaryotic cell, **60, 85**  
 euploid, **165, 170**

eutherian mammal, **396**  
 Eutherian mammals, **393**  
 eutrophication, **542, 564**  
 evaporation, **35, 51**  
 evolution, **12, 24**  
 Excavata, **306, 319**  
 exergonic, **113**  
 exergonic reactions, **96**  
 exocrine gland, **441**  
 Exocrine glands, **421**  
 Exocytosis, **83**  
 exocytosis, **85**  
 exon, **220**  
 exons, **212**  
 Exotic species, **579**  
 exotic species, **590**  
 exponential growth, **504, 525**  
 external fertilization, **481, 495**  
 extinction, **570, 590**  
 extinction rate, **590**  
 extinction rates, **584**  
 extracellular digestion, **365, 396**  
 extracellular matrix, **70, 85**  
 extremophile, **319**  
 extremophiles, **294**

## F

F<sub>1</sub>, **175, 194**  
 F<sub>2</sub>, **175, 194**  
 facilitated transport, **78, 85**  
 fallout, **546, 564**  
 falsifiable, **20, 24**  
 family, **276, 288**  
 fat, **43, 51**  
 Feedback inhibition, **102**  
 feedback inhibition, **113**  
 fermentation, **108, 113**  
 fern, **351**  
 ferns, **336**  
 fertilization, **157, 170**  
 fibrous joint, **441**  
 fibrous joints, **428**  
 filament, **344, 351**  
 Fission, **478**  
 fission, **495**  
 Flagella, **64**  
 flagellum, **85**  
 fluid mosaic model, **74, 85**  
 follicle stimulating hormone (FSH), **490, 495**  
 food chain, **531, 564**  
 food web, **533, 564**  
 foodborne disease, **299, 319**  
 Foundation species, **521**  
 foundation species, **525**

founder effect, **257, 270**  
 fragmentation, **363, 396, 495**  
 Fragmentation, **479**  
 frog, **396**  
 Frogs, **389**  
 frontal lobe, **436, 441**  
 FtsZ, **147, 149**

## G

G<sub>0</sub> phase, **141, 149**  
 G<sub>1</sub> phase, **137, 149**  
 G<sub>2</sub> phase, **138, 149**  
 gallbladder, **411, 441**  
 gametangia, **327**  
 gametangium, **351**  
 gamete, **149**  
 gametes, **136**  
 gametophyte, **170, 327, 351**  
 gametophytes, **157**  
 gap junction, **85**  
 Gap junctions, **72**  
 gastrodermis, **364, 396**  
 gastrovascular cavity, **365, 396**  
 gastrulation, **484, 495**  
 Gel electrophoresis, **226**  
 gel electrophoresis, **245**  
 gemmule, **396**  
 gemmules, **363**  
 gene, **149**  
 gene expression, **216, 220**  
 gene flow, **257, 270**  
 gene pool, **254, 270**  
 Gene therapy, **233**  
 gene therapy, **245**  
 genes, **136**  
 genetic code, **214, 220**  
 Genetic diversity, **569**  
 genetic diversity, **590**  
 genetic drift, **255, 270**  
 genetic engineering, **232, 245**  
 genetic map, **236, 245**  
 genetic testing, **245**  
 genetically modified organism, **232**  
 genetically modified organism (GMO), **245**  
 genome, **136, 149**  
 genomics, **236, 245**  
 genotype, **178, 194**  
 genus, **276, 288**  
 germ cell, **170**  
 germ cells, **155**  
 germ layer, **396**  
 germ layers, **359**  
 gestation, **493, 495**

gestation period, **493, 495**  
 ginkgophyte, **351**  
 ginkgophyte, **342**  
 glia, **432, 441**  
 Glomeromycota, **314, 319**  
 Glycogen, **41**  
 glycogen, **51**  
 Glycolysis, **103**  
 glycolysis, **113**  
 glycoprotein, **451, 472**  
 gnathostome, **396**  
 Gnathostomes, **386**  
 gnetophyte, **351**  
 Gnetophytes, **342**  
 Golgi apparatus, **66, 86**  
 gonadotropin-releasing hormone (GnRH), **490, 495**  
 Gram-negative, **295, 319**  
 Gram-positive, **295, 319**  
 granum, **121, 132**  
 grazing food web, **534, 564**  
 gross primary productivity, **535, 564**  
 gymnosperm, **351**  
 Gymnosperms, **339**  
 gynoecium, **344, 351**

## H

habitat heterogeneity, **572, 590**  
 hagfish, **396**  
 Hagfishes, **385**  
 haplodiplontic, **327, 351**  
 haploid, **136, 149**  
 haploid-dominant, **155, 170**  
 Haplontic, **327**  
 haplontic, **351**  
 heat energy, **94, 113**  
 helicase, **205, 220**  
 helper T lymphocyte (T<sub>H</sub>), **472**  
 hemizygous, **189, 194**  
 hemocoel, **371, 396**  
 herbaceous, **349, 351**  
 Hermaphroditism, **480**  
 hermaphroditism, **495**  
 heterodont teeth, **392, 396**  
 heterosporous, **327, 351**  
 heterotroph, **132**  
 Heterotrophs, **118**  
 heterozygous, **179, 194**  
 hippocampus, **436, 441**  
 homeostasis, **8, 24**  
 homologous chromosomes, **136, 149**  
 homologous structure, **270**  
 homologous structures, **253**

homosporous, **327, 351**  
 homozygous, **178, 194**  
 hormone, **51, 441**  
 hormone receptors, **421**  
 Hormones, **45, 421**  
 hornwort, **351**  
 hornworts, **333**  
 horsetail, **351**  
 Horsetails, **335**  
 host, **519, 525**  
 human beta chorionic gonadotropin (β-HCG), **493, 495**  
 humoral immune response, **460, 472**  
 hybridization, **194**  
 hybridizations, **175**  
 hydrogen bond, **33, 51**  
 hydrophilic, **34, 52**  
 hydrophobic, **34, 52**  
 hydrosphere, **537, 564**  
 hydrothermal vent, **293, 319**  
 hyoid bone, **427, 441**  
 hypersensitivity, **469, 472**  
 hypertonic, **79, 86**  
 hypha, **312, 319**  
 hypothalamus, **437, 441**  
 hypothesis, **18, 24**  
 hypothesis-based science, **19, 24**  
 hypotonic, **79, 86**

## I

immune tolerance, **468, 473**  
 Immunodeficiency, **469**  
 immunodeficiency, **473**  
 incomplete dominance, **186, 194**  
 Inductive reasoning, **18**  
 inductive reasoning, **24**  
 inferior vena cava, **417, 441**  
 inflammation, **457, 473**  
 inheritance of acquired characteristics, **250, 270**  
 inhibin, **491, 495**  
 Innate immunity, **456**  
 innate immunity, **473**  
 inner cell mass, **483, 495**  
 interferon, **457, 473**  
 interkinesis, **161, 170**  
 internal fertilization, **481, 495**  
 interphase, **137, 149**  
 interstitial cell of Leydig, **495**  
 interstitial cells of Leydig, **485**  
 interstitial fluid, **406, 441**  
 intertidal zone, **555, 564**



intracellular, **421**  
 intracellular digestion, **362, 396**  
 intracellular hormone receptor, **441**  
 intraspecific competition, **506, 525**  
 intron, **220**  
 introns, **212**  
 ion, **31, 52**  
 ionic bond, **32, 52**  
 Island biogeography, **521**  
 island biogeography, **525**  
 isotonic, **80, 86**  
 isotope, **52**  
 Isotopes, **29**

## J

J-shaped growth curve, **505, 525**  
 joint, **428, 442**

## K

K-selected species, **510, 525**  
 karyogram, **164, 170**  
 karyotype, **164, 170**  
 keystone species, **522, 525**  
 kidney, **442**  
 kidneys, **406**  
 kinetic energy, **95, 113**  
 kinetochore, **140, 149**  
 kingdom, **276, 288**

## L

labia majora, **487, 495**  
 labia minora, **487, 495**  
 lagging strand, **205, 220**  
 lamprey, **396**  
 Lampreys, **386**  
 lancelet, **396**  
 Lancelets, **384**  
 large intestine, **411, 442**  
 larynx, **415, 442**  
 lateral, **387**  
 lateral line, **397**  
 law of dominance, **179, 194**  
 law of independent assortment, **183, 194**  
 law of segregation, **181, 194**  
 leading strand, **205, 220**  
 lichen, **319**  
 Lichens, **317**  
 life cycle, **170**  
 life cycles, **154**  
 life science, **24**

life sciences, **18**  
 life table, **525**  
 life tables, **500**  
 light-dependent reaction, **132**  
 light-dependent reactions, **121**  
 limbic system, **437, 442**  
 line, **387**  
 linkage, **191, 194**  
 Lipids, **42**  
 lipids, **52**  
 litmus, **37**  
 litmus paper, **52**  
 liver, **411, 442**  
 liverwort, **352**  
 Liverworts, **333**  
 locus, **136, 149**  
 logistic growth, **505, 525**  
 Lophotrochozoa, **374, 397**  
 luteinizing hormone (LH), **490, 495**  
 Lymph, **466**  
 lymph, **473**  
 lymphocyte, **458, 473**  
 lysosome, **86**  
 lysosomes, **66**

## M

macroevolution, **254, 270**  
 macromolecule, **24, 52**  
 macromolecules, **9, 39**  
 macrophage, **457, 473**  
 madreporite, **381, 397**  
 major histocompatibility class (MHC) I, **473**  
 major histocompatibility class (MHC) I molecules, **458**  
 major histocompatibility class (MHC) II molecule, **473**  
 mammal, **397**  
 Mammals, **392**  
 mammary gland, **397**  
 Mammary glands, **392**  
 mantle, **375, 397**  
 mark and recapture, **501, 525**  
 marsupial, **397**  
 Marsupials, **392**  
 mass number, **28, 52**  
 mast cell, **473**  
 Mast cells, **457**  
 Matter, **28**  
 matter, **52**  
 maximum parsimony, **287, 288**  
 medusa, **364, 397**  
 megasporocyte, **339, 352**  
 meiosis, **154, 170**  
 meiosis I, **157, 170**  
 Meiosis II, **157**  
 meiosis II, **170**  
 membrane potential, **442**  
 memory cell, **464, 473**  
 meninges, **435, 442**  
 menstrual cycle, **491, 495**  
 mesoglea, **364, 397**  
 mesohyl, **362, 397**  
 mesophyll, **120, 132**  
 metabolism, **92, 114**  
 Metagenomics, **240**  
 metagenomics, **245**  
 metamerism, **379, 397**  
 metaphase, **140, 149**  
 metaphase plate, **140, 149**  
 MHC class II molecule, **461**  
 microbial mat, **293, 320**  
 microevolution, **254, 270**  
 microscope, **56, 86**  
 microsporocyte, **352**  
 microsporocytes, **339**  
 migration, **255, 270**  
 mimicry, **516, 525**  
 mineral, **442**  
 Minerals, **413**  
 mismatch repair, **208, 220**  
 Mitochondria, **68**  
 mitochondria, **86**  
 mitosis, **138, 149**  
 mitotic, **137, 138**  
 mitotic phase, **149**  
 mitotic spindle, **149**  
 model organism, **245**  
 model organisms, **238**  
 model system, **174, 194**  
 modern synthesis, **254, 270**  
 mold, **320**  
 molds, **313**  
 molecular systematics, **284, 288**  
 molecule, **9, 24**  
 Mollusca, **374, 397**  
 monocot, **352**  
 monocots, **347**  
 monocyte, **457, 473**  
 monoecious, **363, 397**  
 monohybrid, **180, 194**  
 monophyletic group, **285, 288**  
 monosaccharide, **52**  
 Monosaccharides, **40**  
 monosomy, **165, 170**  
 monotreme, **397**  
 monotremes, **392**  
 mortality rate, **502, 525**  
 moss, **352**  
 mosses, **334**

mRNA, **210, 220**  
 MRSA, **320**  
 mutation, **209, 220**  
 mutualism, **519, 525**  
 mycelium, **312, 320**  
 Mycorrhiza, **316**  
 mycorrhiza, **320**  
 mycoses, **315**  
 mycosis, **320**  
 myelin sheath, **433, 442**  
 myofibril, **442**  
 myofibrils, **430**  
 myofilament, **442**  
 myofilaments, **431**  
 Myxini, **385, 397**

## N

nacre, **376, 397**  
 nasal cavity, **415, 442**  
 natural killer (NK) cell, **458, 473**  
 natural science, **24**  
 natural sciences, **18**  
 Natural selection, **251**  
 natural selection, **270**  
 nematocyst, **397**  
 nematocysts, **363**  
 Nematoda, **370, 397**  
 nephron, **442**  
 nephrons, **407**  
 neritic zone, **556, 564**  
 Net primary productivity, **535**  
 net primary productivity, **564**  
 neuron, **442**  
 neurons, **432**  
 neutron, **52**  
 Neutrons, **28**  
 neutrophil, **458, 473**  
 nitrogenous base, **200, 220**  
 non-renewable resource, **541, 564**  
 noncompetitive inhibition, **100, 114**  
 nondisjunction, **164, 170**  
 nonpolar covalent bond, **52**  
 Nonpolar covalent bonds, **32**  
 nontemplate strand, **211, 220**  
 nonvascular plant, **352**  
 nonvascular plants, **331**  
 notochord, **382, 397**  
 nuclear envelope, **65, 86**  
 nucleic acid, **52**  
 nucleic acids, **49**  
 nucleolus, **65, 86**  
 nucleotide, **52**

nucleotide excision repair, **208, 220**  
 nucleotides, **49**  
 nucleus, **28, 52, 65, 86**

## O

occipital lobe, **436, 442**  
 oceanic zone, **556, 564**  
 octet rule, **31, 52**  
 oil, **52**  
 oils, **44**  
 Okazaki fragments, **205, 220**  
 oncogene, **150**  
 oncogenes, **143**  
 one-child policy, **513, 525**  
 oogenesis, **488, 495**  
 open circulatory system, **442**  
 Open circulatory systems, **417**  
 Opisthokonta, **306, 320**  
 oral cavity, **409, 442**  
 order, **276, 288**  
 organ, **24**  
 organ system, **10, 24**  
 organelle, **24, 86**  
 organelles, **10, 60**  
 organism, **24**  
 Organisms, **10**  
 organogenesis, **484, 496**  
 Organs, **10**  
 origin, **145, 150**  
 osculum, **362, 397**  
 osmolarity, **79, 86**  
 Osmoregulation, **406**  
 osmoregulation, **442**  
 Osmosis, **79**  
 osmosis, **86**  
 osmotic balance, **406, 442**  
 Osteichthyes, **387, 397**  
 ostracoderm, **397**  
 ostracoderms, **385**  
 ovarian cycle, **491, 496**  
 ovary, **344, 352**  
 oviduct, **496**  
 oviducts, **487**  
 oviparity, **482, 496**  
 ovoviparity, **482, 496**  
 ovulation, **492, 496**  
 oxidative phosphorylation, **105, 114**

## P

P, **175, 194**  
 pancreas, **411, 423, 442**  
 pandemic, **320**  
 pandemics, **297**

paper, **37**  
 parasite, **320, 519, 525**  
 parasites, **305**  
 parasympathetic nervous system, **439, 442**  
 parathyroid gland, **442**  
 parathyroid glands, **423**  
 parietal lobe, **436, 442**  
 Parthenogenesis, **480**  
 parthenogenesis, **496**  
 passive immune, **461**  
 passive immunity, **473**  
 Passive transport, **77**  
 passive transport, **86**  
 pathogen, **296, 320**  
 pectoral girdle, **428, 442**  
 peer-reviewed article, **24**  
 Peer-reviewed articles, **23**  
 pelagic realm, **555, 564**  
 pellicle, **320**  
 pellicles, **305**  
 pelvic girdle, **428, 442**  
 penis, **485, 496**  
 pepsin, **410, 442**  
 peptidoglycan, **295, 320**  
 periodic table of elements, **29, 52**  
 peripheral nervous system (PNS), **437, 442**  
 peristalsis, **408, 442**  
 permafrost, **553, 564**  
 peroxisome, **86**  
 Peroxisomes, **68**  
 petal, **352**  
 Petals, **344**  
 Petromyzontidae, **386, 397**  
 pH scale, **37, 52**  
 Phagocytosis, **83**  
 phagocytosis, **86**  
 Pharmacogenomics, **240**  
 pharmacogenomics, **245**  
 pharyngeal slit, **397**  
 Pharyngeal slits, **382**  
 pharynx, **415, 442**  
 phase, **137**  
 phenotype, **178, 194**  
 phloem, **334, 352**  
 phosphate group, **200, 220**  
 phospholipid, **52**  
 Phospholipids, **45**  
 photic zone, **555, 564**  
 photoautotroph, **132, 564**  
 photoautotrophs, **118, 535**  
 photon, **124, 132**  
 photosystem, **124, 132**  
 phototroph, **320**

phototrophs, **292**  
 phylogenetic tree, **14, 24, 279, 288**  
 phylogeny, **276, 288**  
 phylum, **276, 288**  
 physical map, **245**  
 Physical maps, **236**  
 physical science, **24**  
 physical sciences, **18**  
 pigment, **120, 132**  
 pinocytosis, **83, 86**  
 pioneer species, **524, 526**  
 pistil, **344, 352**  
 pituitary gland, **422, 443**  
 placenta, **493, 496**  
 planktivore, **564**  
 planktivores, **558**  
 plasma membrane, **63, 86**  
 plasmid, **228, 245**  
 plasmodesma, **86**  
 Plasmodesmata, **71**  
 plastid, **303, 320**  
 pneumatic, **391**  
 pneumatic bone, **397**  
 polar covalent bond, **32, 52**  
 Polymerase chain reaction (PCR), **227**  
 polymerase chain reaction (PCR), **245**  
 polyp, **364, 397**  
 polypeptide, **46, 52**  
 polyploid, **167, 170**  
 polysaccharide, **41, 52**  
 population, **12, 24**  
 population density, **500, 526**  
 population genetics, **254, 270**  
 population size, **500, 526**  
 Porifera, **361, 397**  
 post-anal tail, **383, 397**  
 post-transcriptional, **217, 220**  
 post-translational, **217, 220**  
 potential energy, **95, 114**  
 primary bronchi, **415**  
 primary bronchus, **443**  
 primary consumer, **564**  
 primary consumers, **531**  
 primary immune response, **464, 473**  
 primary succession, **523, 526**  
 Primates, **393, 397**  
 primer, **205, 221**  
 producer, **564**  
 producers, **531**  
 progesterone, **491, 496**  
 prokaryote, **24**  
 Prokaryotes, **10**

prokaryotic cell, **59, 86**  
 prometaphase, **139, 150**  
 promoter, **210, 221**  
 prophase, **139, 150**  
 Prosimians, **393**  
 prosimians, **398**  
 prostate gland, **486, 496**  
 protein, **52**  
 protein signature, **243, 245**  
 Proteins, **45**  
 proteomics, **243, 245**  
 proto-oncogene, **150**  
 proto-oncogenes, **143**  
 proton, **28, 52**  
 protostome, **398**  
 Protostomes, **360**  
 pseudocoelomate, **398**  
 pseudocoelomates, **360**  
 pseudoepitidoglycan, **296, 320**  
 pulmonary circulation, **417, 443**  
 Punnett square, **180, 194**

## Q

quadrat, **501, 526**  
 quiescent, **150**

## R

*r*-selected species, **510, 526**  
 radial symmetry, **358, 398**  
 radioactive isotope, **52**  
 radioactive isotopes, **29**  
 radula, **374, 398**  
 receptor-mediated endocytosis, **83, 86**  
 Recessive, **177**  
 recessive, **195**  
 reciprocal cross, **177, 195**  
 recombinant, **158, 170**  
 recombinant DNA, **230, 245**  
 recombinant protein, **245**  
 recombinant proteins, **230**  
 recombination, **191, 195**  
 rectum, **411, 443**  
 reduction division, **162, 170**  
 Relative species abundance, **521**  
 relative species abundance, **526**  
 renal artery, **407, 443**  
 renal vein, **407, 443**  
 replication fork, **221**  
 replication forks, **205**  
 Reproductive cloning, **230**  
 reproductive cloning, **245**  
 resilience, **531**  
 resilience (ecological), **564**

resistance, **531**  
 resistance (ecological), **564**  
 restriction enzyme, **245**  
 restriction enzymes, **229**  
 reverse genetics, **232, 245**  
 Rhizaria, **306, 320**  
 ribonucleic acid (RNA), **49, 52**  
 ribosome, **86**  
 Ribosomes, **68**  
 RNA polymerase, **211, 221**  
 rooted, **279, 288**  
 rough endoplasmic reticulum (RER), **65, 86**  
 rRNA, **213, 221**

## S

S phase, **138, 150**  
 S-shaped curve, **505**  
 S-shaped growth curve, **526**  
 salamander, **398**  
 salamanders, **388**  
 salivary gland, **443**  
 salivary glands, **409**  
 saprobe, **320**  
 saprobes, **310**  
 sarcolemma, **430, 443**  
 sarcomere, **431, 443**  
 Sarcopterygii, **387, 398**  
 saturated fatty acid, **52**  
 Saturated fatty acids, **44**  
 savanna, **564**  
 Savannas, **549**  
 Science, **17**  
 science, **19, 25**  
 scientific law, **25**  
 scientific laws, **18**  
 scientific method, **18, 25**  
 scientific theory, **18, 25**  
 scrotum, **485, 496**  
 sebaceous gland, **398**  
 Sebaceous glands, **392**  
 secondary consumer, **564**  
 Secondary consumers, **531**  
 secondary immune response, **465, 473**  
 secondary plant compound, **590**  
 secondary plant compounds, **572**  
 secondary succession, **523, 526**  
 selectively permeable, **77, 86**  
 Semen, **485**  
 semen, **496**  
 semiconservative replication, **205, 221**  
 seminal vesicle, **496**

seminal vesicles, **486**  
 seminiferous tubule, **496**  
 seminiferous tubules, **485**  
 sensory-somatic nervous system, **437, 443**  
 sepal, **352**  
 sepals, **344**  
 septum, **145, 150, 313, 320**  
 Sertoli cell, **496**  
 Sertoli cells, **485**  
 set point, **404, 443**  
 sex determination, **481, 496**  
 sexual reproduction, **478, 496**  
 shared ancestral character, **286, 288**  
 shared derived character, **286, 288**  
 sister taxa, **279, 288**  
 Skeletal muscle tissue, **430**  
 skeletal muscle tissue, **443**  
 skull, **427, 443**  
 small intestine, **410, 443**  
 smooth endoplasmic reticulum (SER), **66, 86**  
 Smooth muscle tissue, **430**  
 smooth muscle tissue, **443**  
 solute, **79, 86**  
 solvent, **36, 53**  
 somatic cell, **157, 170**  
 source water, **561, 564**  
 speciation, **262, 270**  
 species, **276, 288**  
 species distribution pattern, **501, 526**  
 Species richness, **520**  
 species richness, **526**  
 species-area relationship, **584, 590**  
 spermatogenesis, **488, 496**  
 Sphenodontia, **391, 398**  
 spicule, **398**  
 spicules, **362**  
 spinal cord, **443**  
 spindle, **138**  
 spiracle, **398**  
 spiracles, **371**  
 splicing, **212, 221**  
 spongocoel, **362, 398**  
 sporangia, **327**  
 sporangium, **352**  
 sporophyll, **352**  
 sporophylls, **335**  
 sporophyte, **157, 170, 327, 352**  
 Squamata, **391, 398**  
 stamen, **352**  
 stamens, **344**

Starch, **41**  
 starch, **53**  
 start codon, **214, 221**  
 stereoscopic vision, **393, 398**  
 steroid, **53**  
 steroids, **45**  
 stigma, **344, 352**  
 stoma, **132**  
 stomach, **410, 443**  
 stomata, **120**  
 stop codon, **221**  
 stop codons, **214**  
 Strobili, **335**  
 strobili, **352**  
 stroma, **121, 132**  
 stromatolite, **293, 320**  
 style, **344, 352**  
 subduction, **541, 564**  
 substrate, **114**  
 substrates, **98**  
 subtropical desert, **564**  
 Subtropical deserts, **549**  
 sudoriferous gland, **398**  
 Sudoriferous glands, **392**  
 superior vena cava, **417, 443**  
 surface tension, **36, 53**  
 survivorship curve, **503, 526**  
 swim bladder, **387, 398**  
 sympathetic nervous system, **438, 443**  
 Sympatric speciation, **262**  
 sympatric speciation, **270**  
 synapse, **443**  
 synapses, **432**  
 synapsis, **158, 170**  
 synaptic cleft, **435, 443**  
 syngamy, **327, 352**  
 Synovial joints, **428**  
 synovial joints, **443**  
 systematics, **276, 288**  
 systemic circulation, **417, 443**  
 systole, **418, 443**

## T

T cell, **473**  
 T cells, **460**  
 tadpole, **389, 398**  
 taxon, **276, 288**  
 Taxonomy, **276**  
 taxonomy, **288**  
 telomerase, **206, 221**  
 telomere, **221**  
 telomeres, **206**  
 telophase, **140, 150**  
 temperate forest, **564**

Temperate forests, **552**  
 temperate grassland, **565**  
 Temperate grasslands, **551**  
 Temperature, **35**  
 temperature, **53**  
 template strand, **211, 221**  
 temporal lobe, **436, 443**  
 tertiary consumer, **565**  
 Tertiary consumers, **531**  
 test cross, **181, 195**  
 testes, **485, 496**  
 Testosterone, **490**  
 testosterone, **496**  
 Testudines, **391, 398**  
 tetrad, **171**  
 tetrads, **158**  
*Tetrapod*, **383**  
 tetrapod, **398**  
 thalamus, **437, 443**  
 thallus, **312, 320**  
 Thermodynamics, **93**  
 thermodynamics, **114**  
 thoracic cage, **428, 444**  
 threshold of excitation, **432, 444**  
 thylakoid, **132**  
 thylakoids, **120**  
 thymus, **424, 444**  
 thyroid gland, **423, 444**  
 tight junction, **72, 87**  
 tissue, **25**  
 tissues, **10**  
 Tonicity, **79**  
 tonicity, **87**  
 trachea, **398, 415, 444**  
 tracheae, **371**  
 tragedy of the commons, **578, 590**  
 trait, **176, 195**  
*trans-fat*, **44, 53**  
 transcription bubble, **210, 221**  
 transduction, **296, 320**  
 transformation, **296, 320**  
 transgenic, **232, 245**  
 Transgenic, **235**  
 translocation, **171**  
 translocations, **164**  
 tricuspid valve, **417, 444**  
 triglyceride, **53**  
 triglycerides, **43**  
 triploblast, **398**  
 triploblasts, **359**  
 trisomy, **165, 171**  
 tRNA, **221**  
 tRNAs, **213**  
 trophic level, **531, 565**  
 trophoblast, **483, 496**



tropical rainforest, **565**  
Tropical rainforests, **548**  
tumor suppressor gene, **150**  
Tumor suppressor genes, **144**  
tunicate, **398**  
tunicates, **383**

## U

unified cell theory, **59, 87**  
unsaturated fatty acid, **44, 53**  
up-regulation, **422, 444**  
ureter, **407, 444**  
urethra, **407, 444**  
urinary bladder, **407, 444**  
Urochordata, **383, 398**  
Urodela, **388, 398**  
uterus, **487, 496**

## V

vaccine, **455, 473**  
vacuole, **87**  
vacuoles, **67**  
vagina, **487, 496**  
van der Waals interaction, **53**  
van der Waals interactions, **33**  
variable, **20, 25**  
variation, **252, 270**  
vascular plant, **352**  
Vascular plants, **331**  
vein, **444**  
Veins, **420**  
ventricle, **417, 444**  
vertebral column, **382, 398, 428, 444**  
vesicle, **87**  
Vesicles, **67**  
vestigial structure, **270**  
vestigial structures, **259**  
vicariance, **263, 270**  
viral envelope, **451, 473**  
virion, **451, 473**  
vitamin, **444**  
Vitamins, **413**  
viviparity, **482, 496**

## W

water vascular system, **380, 398**  
wavelength, **123, 132**  
wetland, **565**  
Wetlands, **562**  
whisk fern, **352**  
whisk ferns, **336**  
white blood cell, **457, 473**  
white-nose syndrome, **580, 590**

Whole genome sequencing, **238**  
whole genome sequencing, **245**  
wild type, **187, 195**

## X

X inactivation, **166, 171**  
X-linked, **188, 195**  
Xylem, **334**  
xylem, **352**

## Y

yeast, **320**  
yeasts, **312**

## Z

zero population growth, **505, 526**  
zona pellucida, **483, 496**  
Zygomycota, **314, 320**