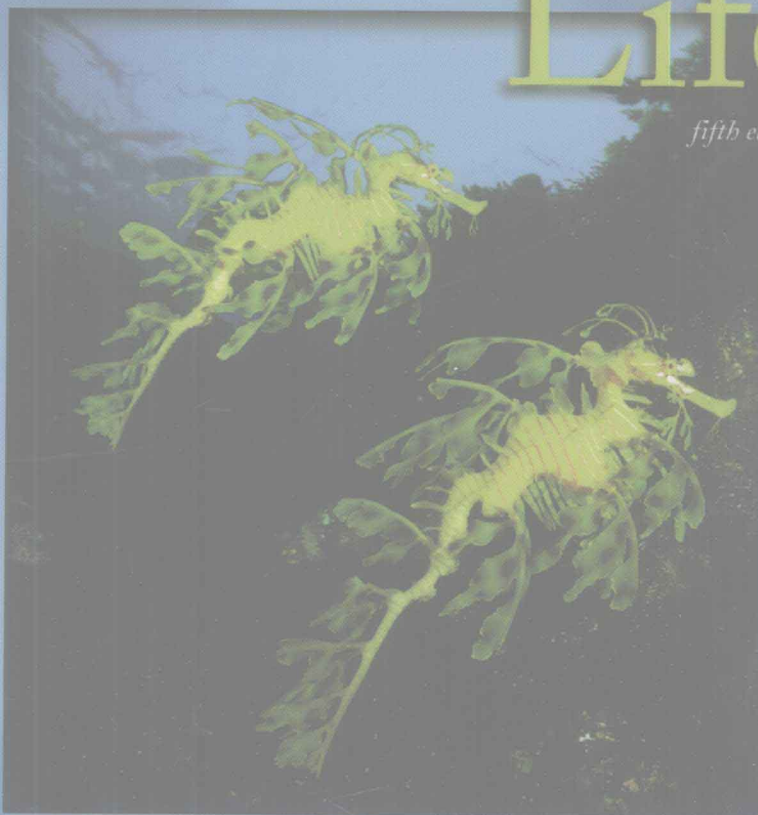


STUDENT STUDY

Art Notebook

Life

fifth edition



Lewis • Gaffin • Hoefnagels • Parker

Student Study Art Notebook

to accompany

Life

Fifth Edition

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Student Study Art Notebook to accompany
LIFE, FIFTH EDITION
RICKI LEWIS, DOUGLAS GAFFIN, MARIËLLE HOEFNAGELS, AND BRUCE PARKER

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ISBN 0-07-297799-X

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Chapter 1

Levels of biological organization reveal common features of all life	Figure 1.1	1
An emergent property—from tiles to tubes	Figure 1.2	2
Life is connected	Figure 1.3	2
Organizing Life's Diversity	Figure 1.7	3
The scientific method is a means of careful discovery	Figure 1.8	3
Experiments follow rules	Figure 1.10	4

Chapter 2

The periodic table of elements	Figure 2.1	5
Atoms have structure	Figure 2.2	5
Structures of the atoms prevalent in life	Figure 2.3	6
Electron orbitals determine molecular shape	Figure 2.4	6
Covalent bonds form molecules	Figure 2.5	6
Different types of diagrams are used to represent molecules	Figure 2.6	7
Carbon atoms form four covalent bonds	Figure 2.7	7
Polar covalent bonds	Figure 2.8	8
Table salt, an ionically bonded molecule	Figure 2.9	8
Solutions are mixtures of molecules	Figure 2.10	9
The pH scale	Figure 2.11	10
Carbohydrates can be simple or complex	Figure 2.13	11
Complex carbohydrates have multiple functions	Figure 2.14	12
Lipids form complex molecules	Figure 2.15	13
Lipids in cell membranes	Figure 2.16	13
Amino acids join to form peptides	Figure 2.18	14
Four levels of protein structure	Figure 2.20	15
Enzyme action	Figure 2.21	15
DNA structure	Figure 2.22	16

Chapter 3

Ranges of the light, electron, and scanning probe microscopes	Figure 3.3	17
---	------------	----

Cells of the three domains of life	Figure 3.4	18
The important relationship between surface area and volume	Figure 3.5	18
Anatomy of a bacterium	Figure 3.6	19
An animal cell	Figure 3.9	20
A plant cell	Figure 3.10	21
Secretion	Figure 3.11	22
The nucleus	Figure 3.12	22
The endoplasmic reticulum	Figure 3.13	23
The Golgi apparatus	Figure 3.14	23
Lysosomes	Figure 3.15	24
Peroxisomes	Figure 3.16	25
Mitochondria extract energy from food	Figure 3.17	25
Chloroplasts are the sites of photosynthesis	Figure 3.18	26
The endosymbiont theory	Figure 3.19	26
Chapter 4		
The two faces of membrane phospholipids	Figure 4.2	27
Anatomy of a cell membrane	Figure 4.3	28
Diffusion	Figure 4.4	28
Osmosis	Figure 4.5	28
Diffusion affects cell shape	Figure 4.6	29
Aquatic organisms must pump water	Figure 4.7	29
Plant cells keep their shapes by regulating diffusion	Figure 4.8	30
Transport moves substances	Figure 4.9	30
The sodium-potassium pump	Figure 4.10	31
Cotransport	Figure 4.11	31
Endocytosis and Exocytosis	Figure 4.12	32
Three types of endocytosis	Figure 4.13	32
The cytoskeleton is made of protein rods and tubules	Figure 4.14	33
Microtubules move cells	Figure 4.16	33
Muscle acts by protein interactions	Figure 4.17	34
Intermediate filaments in skin	Figure 4.18	34
Animal cell connections	Figure 4.19	35
Plant cell connections	Figure 4.20	36
Cellular adhesion aids in defenses	Figure 4.21	37
Signal transduction	Figure 4.22	37

Chapter 5

Energy can take many forms	Figure 5.2
Potential energy and kinetic energy	Figure 5.5
Metabolic pathways	Figure 5.8
Anabolism versus catabolism	Figure 5.9
Endergonic and exergonic reactions	Figure 5.10
Chemical equilibrium	Figure 5.11
ATP breakdown and formation link biochemical reactions	Figure 5.12
NADH carries electrons	Figure 5.13
Electron transport chains	Figure 5.14
Enzymes lower the activation energy	Figure 5.15
Enzymes are specific	Figure 5.16
Negative feedback (feedback inhibition)	Figure 5.17

Chapter 6

Oxygen changed the living world	Figure 6.2
The electromagnetic spectrum	Figure 6.3
Leaf color	Figure 6.4
Chlorophyll	Figure 6.5
Other photosynthetic pigments	Figure 6.6
Chloroplasts	Figure 6.7
Collecting light energy	Figure 6.8
Overview of photosynthesis	Figure 6.9
The light reactions of photosynthesis	Figure 6.10
Chemiosmotic phosphorylation	Figure 6.11
Carbon fixation	Figure 6.12
C ₄ photosynthesis	Figure 6.13
Different environments call for different approaches to photosynthesis	Figure 6.14

Chapter 7

All cells undergo glycolysis	Figure 7.2
An overview of cellular respiration	Figure 7.3
Cellular respiration occurs in mitochondria	Figure 7.4
Glycolysis	Figure 7.5
Transition to the mitochondria	Figure 7.6
Products of the Krebs cycle	Figure 7.7
The electron transport chain of the mitochondria	Figure 7.9
Two views of ATP synthase	Figure 7.10
Negative feedback regulates aerobic respiration	Figure 7.11
How nutrients enter the energy pathways	Figure 7.12
Fermentation	Figure 7.13
Energy yield of respiration	Figure 7.14
The energy pathways and cycles connect life	Figure 7.15

Chapter 8

Cell division and apoptosis regulate development	Figure 8.1
The cell cycle	Figure 8.2
Cloning mammals requires cell cycle synchronization	Figure 8.3
Replicated and unreplicated chromosomes	Figure 8.4
The spindle aligns chromosomes	Figure 8.5
Steps of mitosis	Figure 8.7
Cytokinesis begins as the chromosomes separate	Figure 8.8
Cytokinesis in plants	Figure 8.9
Cell cycle control	Figure 8.10
Telomeres	Figure 8.11
Contact inhibition	Figure 8.12
Cyclins and kinases pair to regulate the cell cycle	Figure 8.13
Stem cells	Figure 8.14
Apoptosis carves toes	Figure 8.15
Death of a cell	Figure 8.16
Cancers take many years to spread	Figure 8.17

Chapter 9

Sexual reproduction	Figure 9.2
Reproduction in <i>Chlamydomonas</i>	Figure 9.4
A schematic overview of meiosis	Figure 9.6
An overview of meiosis	Figure 9.7
Crossing over recombines genes	Figure 9.8
Independent assortment	Figure 9.9
Differences between mitosis and meiosis	Figure 9.10
Human sperm	Figure 9.12
Sperm formation (spermatogenesis)	Figure 9.13
Meiosis produces sperm cells	Figure 9.14
Ovum formation (oogenesis)	Figure 9.15
The making of oocytes	Figure 9.16
Oogenesis and spermatogenesis in the human compared	Figure 9.17

Chapter 10

Traits Mendel studied	Figure 10.1
Mendel's experimental approach for breeding peas	Figure 10.2
Mendel crossed short and tall pea plants	Figure 10.3
Homologous chromosomes	Figure 10.4
Mendel's first law—gene segregation	Figure 10.5
A Punnett square	Figure 10.6
Carriers and genotypic ratios	Figure 10.8
A pedigree for an autosomal recessive trait	Figure 10.9

A pedigree for an autosomal dominant trait Figure 10.10	86	Chapter 13	
Plotting a dihybrid cross Figure 10.11	86	DNA to RNA to protein Figure 13.1	108
Meiosis produces genetic variation Figure 10.12	87	DNA and RNA differ functionally and structurally Figure 13.2	108
The product rule Figure 10.13	87	The lactose operon Figure 13.3	109
Lethal alleles Figure 10.14	88	Binding to DNA Figure 13.4	109
Pleiotropy Figure 10.16	89	Transcription begins Figure 13.5	110
Epistasis Figure 10.17	90	The relationship among RNA, the DNA template strand, and the DNA coding strand Figure 13.6	110
Incomplete dominance in snapdragon flowers Figure 10.18	91	Transcription of RNA from DNA Figure 13.7	111
Codominance Figure 10.19	92	The ribosome Figure 13.8	111
Skin color follows a polygenic pattern of inheritance Figure 10.21	92	Transfer RNA Figure 13.9	112
Concordance Figure 10.23	93	Messenger RNA processing—the maturing of the message Figure 13.10	112
Chapter 11		From DNA to RNA to protein Figure 13.11	113
Anatomy of a chromosome Figure 11.1	94	Three at a time Figure 13.12	113
Centromere position is used to distinguish chromosomes Figure 11.2	94	The genetic code does not overlap Figure 13.13	114
Expected results of a dihybrid cross Figure 11.3	95	Beginning translation Figure 13.14	114
Crossing over Figure 11.4	95	Building a polypeptide Figure 13.15	115
Allele configuration is important Figure 11.5	96	Making multiple copies of a protein Figure 13.16	116
Breaking linkage Figure 11.6	96	Sickle cell disease results from a single base change Figure 13.17	116
Environment affects sex determination Figure 11.7	96	Spontaneous mutation Figure 13.18	117
Sex determination in humans Figure 11.9	96	Gene duplication and deletion Figure 13.19	117
Hemophilia A Figure 11.10	97		
X inactivation Figure 11.11	98	Chapter 14	
Extra and missing chromosomes— aneuploidy Figure 11.13	98	Science evolves Figure 14.1	118
Trisomy 21 Down syndrome Figure 11.14	99	Rock layers reveal Earth history and sometimes life history Figure 14.2	118
Chromosomal mistakes Figure 11.15	99	The voyage of the <i>Beagle</i> Figure 14.3	119
A reciprocal translocation Figure 11.16	99	Convergent evolution Figure 14.4	120
Fragile X syndrome Figure 11.17	99	Finch beak shape reflects natural selection Figure 14.5	120
Chapter 12		Chapter 15	
Discovery of a “transforming principle” Figure 12.2	100	Hardy-Weinberg equilibrium—an idealized state when evolution does not occur Figure 15.1	121
DNA is the “transforming principle” Figure 12.3	100	The founder effect Figure 15.2	122
A virus (bacteriophage) infects a bacterium Figure 12.4	101	The bottleneck effect Figure 15.3	122
Hershey-Chase experiment Figure 12.5	101	Types of natural selection Figure 15.4	122
Different ways to represent the DNA double helix Figure 12.7	102	Balanced polymorphism Figure 15.5	123
DNA bases Figure 12.8	102	Factors that alter allele frequencies and thereby contribute to evolution Figure 15.6	124
DNA base pairs Figure 12.9	103		
DNA strands are antiparallel Figure 12.10	103	Chapter 16	
DNA is highly condensed in eukaryotic cells Figure 12.11	104	Different views of species relationships Figure 16.2	125
DNA replication is semiconservative Figure 12.12	105	Placing the Platypus Figure 16.3	125
Overview of DNA replication Figure 12.14	105	Separating species Figure 16.4	126
DNA replication takes many steps Figure 12.15	106	Allopatric speciation Figure 16.5	127
Two types of DNA repair Figure 12.16	107	Parapatric speciation Figure 16.6	127

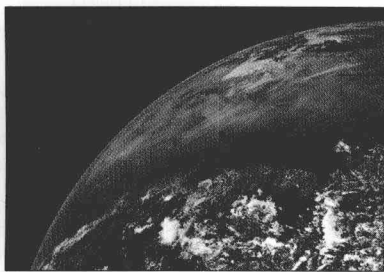
Flycatchers illustrate allopatry and sympatry Figure 16.8	127	An early walk Figure 18.21	148
Plotting evolution Figure 16.9	128	Handy hominid Figure 18.22	148
The pace of evolution—speciation and stasis Figure 16.10	128	Chapter 19	
Adaptive radiation on islands Figure 16.12	128	Tobacco mosaic virus Figure 19.1	149
Adaptive radiation on a global scale Figure 16.13	129	Viruses are small compared to cells Figure 19.3	150
Inbreeding contributes to extinction at the population level Figure 16.14	129	HIV binds to a helper T cell Figure 19.4	151
Catastrophes affect evolution Figure 16.15	130	Viral entry into cells Figure 19.5	152
The world at the time of the Permian extinctions Figure 16.16	130	Plant viruses enter through injury Figure 19.6	152
Chapter 17		A generalized viral replication cycle Figure 19.7	153
Two types of evolutionary tree diagrams Figure 17.2	132	Lysis versus Lysogeny Figure 19.8	153
Constructing a cladogram Figure 17.3	133	Replication of HIV Figure 19.9	154
Fossil distribution yields clues to changing geography Figure 17.5	134	Bats and birds can transport viruses to new hosts Figure 19.10	155
A changing world Figure 17.6	135	Prions change shape Figure 19.12	155
Carbon 14 dating Figure 17.8	136	Chapter 20	
Vertebrate skeletal organization reflects common ancestry Figure 17.9	136	Bacterial cell structure Figure 20.2	156
Comparative anatomy Figure 17.10	137	Gram stain Figure 20.4	157
Homology and Analogy Figure 17.11	138	Prokaryotes can be classified by cell shapes Figure 20.6	158
Humans are very closely related to gorillas and chimpanzees Figure 17.15	138	Prokaryotic cell division Figure 20.9	159
Amino acid sequence similarities are a measure of evolutionary relatedness Figure 17.16	139	Transformation Figure 20.10	159
The degree of DNA hybridization reflects the degree of evolutionary relatedness Figure 17.18	139	Transduction Figure 20.11	160
Chapter 18		Conjugation Figure 20.12	160
A time line of early Earth Figure 18.1	140	Chapter 21	
Chemical evolution Figure 18.2	140	Choanoflagellates resemble choanocytes in sponges Figure 21.1	161
Demonstrating chemical evolution Figure 18.3	141	Life cycle of the cellular slime mold <i>Dictyostelium discoideum</i> Figure 21.7	162
Life in the deep ocean Figure 18.4	141	<i>Euglena</i> Figure 21.8	163
From “soup” to “crepes” Figure 18.5	142	Trypanosomes Figure 21.9	163
A theory of life’s beginnings Figure 18.6	143	Dinoflagellate features Figure 21.20	164
Evolution of metabolic pathways Figure 18.7	144	<i>Plasmodium</i> causes malaria Figure 21.13	164
Precambrian time accounts for five-sixths of Earth’s history Figure 18.8	144	Anatomy of <i>Paramecium</i> Figure 21.14	165
A glimpse of the sequence of appearance of different life-forms on Earth Figure 18.9	145	Reproduction of a green alga, the sea lettuce <i>Ulva</i> Figure 21.10	165
The endosymbiont theory revisited Figure 18.10	145	Diversity of green algae Figure 21.21	166
Plant or animal? Figure 18.13	146	Chapter 22	
From an aquatic to a terrestrial existence Figure 18.16	146	Sexual life cycles Figure 22.1	167
Life in the Mesozoic Figure 18.18	147	Plant diversity Figure 22.2	168
Placental mammals migrated Figure 18.19	148	Diversification of plants after they moved onto dry land Figure 22.3	169
Early hominids Figure 18.20	148	Bryophytes Figure 22.4	170
		Alternation of generations in a bryophyte Figure 22.5	171
		Seedless vascular plants Figure 22.9	172
		Alternation of generations in a fern Figure 22.10	173
		Gymnosperms Figure 22.13	174
		Pine life cycle Figure 22.15	175
		Angiosperms Figure 22.16	176
		Monocots and dicots Figure 22.18	176
		The rise of angiosperms Figure 22.19	177

Chapter 23			
Fungal phyla Figure 23.2	178	Reptilian diversity Figure 25.14	208
The fungal body Figure 23.5	178	The amniote egg Figure 25.15	209
<i>Pilobolus</i> , the "shotgun fungus" Figure 23.6	179	The relationship of birds to other chordates Figure 25.16	209
Zygomycete reproduction Figure 23.8	180	Birds' beaks are related to their functions Figure 25.17	210
Fly killer Figure 23.9	181	Adaptations for flight Figure 25.18	210
Ascomycete reproduction Figure 23.11	181	Feather form and function Figure 25.19	211
Reproduction in basidiomycetes Figure 23.13	182	Mammalian diversity Figure 25.20	212
Anatomy of a lichen Figure 23.15	183	The extant orders of mammalia Figure 25.21	213
		Primate diversity Figure 25.22	213
Chapter 24		Chapter 26	
Animal beginnings? Figure 24.1	184	Parts of a flowering plant Figure 26.1	214
Animal body forms Figure 24.2	184	Primary growth of a dicot's shoot Figure 26.2	215
Gastrulation produces embryonic tissue layers Figure 24.3	185	Opening and closing of stomata Figure 26.5	215
Protostomes versus deuterostomes Figure 24.4	186	Two types of xylem cells Figure 26.6	216
Body cavities Figure 24.5	186	Phloem cells Figure 26.7	216
Animal classification Figure 24.6	187	Stem anatomy Figure 26.8	217
Phylum Porifera Figure 24.7	187	Anatomy of a leaf Figure 26.12	218
Sponge anatomy Figure 24.8	188	Leaf abscission Figure 26.13	219
Phylum Cnidaria Figure 24.9	188	Two main patterns of root organization Figure 26.14	219
Cnidocytes are stinging cells Figure 24.10	189	Anatomy of a primary root Figure 26.15	220
Life cycle of <i>Aurelia</i> , a cnidarian that alternates body forms Figure 24.11	190	Root hairs Figure 26.16	221
Tapeworms Figure 24.13	191	The Casparian strip Figure 26.17	221
A planarian flatworm Figure 24.14	192	Secondary growth produces wood Figure 26.19	222
Molluscan diversity Figure 24.15	192	Anatomy of a secondary stem Figure 26.20	222
Generalized molluscan body plan Figure 24.16	193	Monocots and dicots compared Figure 26.21	223
Annelid diversity Figure 24.17	193		
Anatomy of an earthworm Figure 24.18	194	Chapter 27	
Roundworms Figure 24.20	194	Plant transport systems Figure 27.1	224
The arthropods Figure 24.21	195	Essential nutrients for plants Figure 27.2	225
Mandibulate arthropods Figure 24.23	196	Bacteria provide usable nitrogen to plants Figure 27.5	225
Echinoderm characteristics Figure 24.24	197	Water and dissolved minerals are pulled to treetops Figure 27.6	226
		A column of fluid rises higher in a thin tube than in a wider one Figure 27.7	227
Chapter 25		Two routes into roots Figure 27.8	227
A tree depiction of the types of chordates Figure 25.1	198	Aphids reveal sieve tube pressure Figure 27.9	228
A chordate has four defining characteristics Figure 25.2	198	Photosynthate moves under pressure from a source to a sink Figure 27.10	228
Tunicates Figure 25.3	199		
Lancelets Figure 25.4	200	Chapter 28	
Common ancestry of humans with other vertebrates Figure 25.5	201	Alternation of generations in flowering plants Figure 28.2	229
The jawless fishes Figure 25.6	202	Parts of a flower Figure 28.3	229
Development of jaws Figure 25.7	203	Major steps in the life cycle of a flowering plant Figure 28.4	230
The cartilaginous fishes Figure 25.8	204	Sperm and egg formation in a flowering plant Figure 28.5	231
Built to swim Figure 25.9	205		
The bony fishes Figure 25.10	205		
Fins become legs Figure 25.11	206		
Amphibian diversity Figure 25.12	206		
Phylogenetic relationships of the tetrapods Figure 25.13	207		

Double fertilization Figure 28.9	232	Overview of the human nervous system Figure 31.14	258
A seed houses an embryo Figure 28.10	233	A reflex arc Figure 31.15	259
Fruit parts derive from flower parts Figure 28.11	234	The human brain Figure 31.16	259
Seeds yield new plants Figure 28.13	235	Cerebral specialization Figure 31.17	260
Chapter 29		Somatosensory and motor cortex Figure 31.18	260
Plants bend toward light Figure 29.1	236	The Autonomic nervous system Figure 31.19	261
Auxins promote cell lengthening Figure 29.2	236	Chapter 32	
Apical dominance Figure 29.4	237	Sensory information flow Figure 32.2	262
Gravity influences plant growth Figure 29.7	237	Receptor potentials trigger action potentials Figure 32.3	262
A clinostat Figure 29.8	238	How odorant molecules signal the brain Figure 32.5	263
Flowering responses to day length Figure 29.12	238	Taste Figure 32.6	263
Night-time light flashes inhibit flowering in short-day plants Figure 29.13	239	Invertebrate eyes Figure 32.7	264
The blue pigment phytochrome comes in two forms Figure 29.14	239	Anatomy of the vertebrate eye Figure 32.8	265
The last flash matters Figure 29.15	240	Correcting vision Figure 32.9	266
Experiments reveal that blue light controls heliotropism through auxin Figure 29.19	241	The visual pathway Figure 32.10	266
Chapter 30		From the eyes to the brain Figure 32.11	267
Types of epithelium Figure 30.1	242	Anatomy of the ear Figure 32.12	267
Types of connective tissue Figure 30.2	243	Hearing Figure 32.13	268
Nervous tissue Figure 30.3	244	Correspondence between cochlea and cortex Figure 32.14	268
Human tissue types Figure 30.4	245	Equilibrium and balance Figure 32.15	269
Human organ systems Figure 30.5	246	Touch Figure 32.16	270
Negative feedback systems promote homeostasis Figure 30.6	247	Chapter 33	
Human skin Figure 30.8	248	Chemical messenger systems are based on molecular recognition Figure 33.1	271
Structure of hair and follicle Figure 30.9	249	Exocrine versus endocrine glands Figure 33.2	271
Integumentary specializations Figure 30.10	250	Two types of hormones Figure 33.3	272
Shark skin Figure 30.11	250	Feedback loops regulate hormone action Figure 33.4	272
Chapter 31		The pancreas regulates blood glucose level Figure 33.5	273
Nervous systems in action Figure 31.1	251	Metamorphosis Figure 33.6	273
Parts of a neuron Figure 31.2	251	Endocrine system control Figure 33.7	274
Categories of neurons Figure 31.3	252	Some human endocrine glands Figure 33.8	275
The resting potential Figure 31.4	252	Control of thyroid gland function Figure 33.10	276
The generation of an action potential Figure 31.5	253	Regulation of blood calcium level Figure 33.11	277
Myelin sheaths encase many axons Figure 31.6	254	The adrenal glands Figure 33.12	278
Saltatory conduction Figure 31.7	254	The pancreas Figure 33.13	278
Transmission across a synapse Figure 31.8	255	Diabetes and hypoglycemia Figure 33.14	279
Anatomy of an antidepressant Figure 31.9	255	Control of reproductive hormones Figure 33.15	279
Invertebrate nervous systems Figure 31.11	256	Chapter 34	
Hierarchical organization of the vertebrate nervous system Figure 31.12	256	Earthworm locomotion Figure 34.2	280
Vertebrate brains Figure 31.13	257	Endoskeleton diversity Figure 34.4	280
		The human skeleton Figure 34.6	281

The structure of a long bone	Figure 34.8	282	Chapter 37	
Antagonistic muscles	Figure 34.9	282	Intracellular and extracellular digestion	
Three types of muscle cells and tissues	Figure 34.10	283	Figure 37.2	307
The human muscular system	Figure 34.11	284	One-opening and two-opening digestive systems	Figure 37.3 307
Skeletal muscle organization	Figure 34.12	285	Digestion in a bird	Figure 37.4 308
Anatomy of a muscle fiber	Figure 34.13	285	Digestive systems are adapted to an animal's diet	Figure 37.5 309
The sliding filament model of muscle contraction	Figure 34.14	286	The human digestive system	Figure 37.6 310
How a muscle moves	Figure 34.15	287	Muscles move food	Figure 37.7 311
A neuromuscular junction	Figure 34.16	288	Anatomy of a tooth	Figure 37.8 311
Motor units	Figure 34.17	288	Separating air from food	Figure 37.9 311
The synovial joint—where bone meets bone	Figure 34.18	289	The stomach	Figure 37.10 312
Bones, joints, and muscles work together as lever systems	Figure 34.20	289	Overview of chemical digestion	Figure 37.11 313
Chapter 35			The lining of the small intestine	Figure 37.12 314
Open and closed circulatory systems	Figure 35.1	290	The large intestine	Figure 37.13 314
Vertebrate circulatory diversity	Figure 35.2	290	Food's journey through the human digestive tract	Figure 37.14 315
The journey of blood in the human circulatory system	Figure 35.3	291	Accessory structures	Figure 37.15 315
Human circulatory system	Figure 35.4	292	One healthful diet	Figure 37.16 316
A human heart	Figure 35.5	293	Chapter 38	
Electrical activity in the heart	Figure 35.6	293	Ectothermy and endothermy	Figure 38.1 317
Types of blood vessels	Figure 35.7	294	Countercurrent heat exchange	Figure 38.2 317
Capillaries	Figure 35.8	295	The carotid rete	Figure 38.4 318
Valves in veins help return blood to the heart	Figure 35.9	296	Thermoregulation in humans	Figure 38.5 318
Blood pressure	Figure 35.10	296	Osmoregulation in fishes	Figure 38.7 319
Blood pressure in vessels	Figure 35.11	297	Water gain and loss in a kangaroo rat and a human	Figure 38.9 319
Blood composition	Figure 35.13	297	The flame cell system of a planarian	Figure 38.10 319
Blood clotting	Figure 35.14	298	Earthworm nephridia	Figure 38.11 320
Human lymphatic system	Figure 35.15	299	Excretion in insects	Figure 38.12 320
Lymph vessels and lymph nodes	Figure 35.16	299	Human urinary system	Figure 38.13 321
Chapter 36			Anatomy of a kidney	Figure 38.14 321
Diversity in respiratory surfaces	Figure 36.2	300	Overview of urine formation in the nephron	Figure 38.15 322
Insect tracheal systems	Figure 36.3	300	The glomerulus and glomerular capsule	Figure 38.16 322
Gills	Figure 36.4	301	Activities along a nephron	Figure 38.17 323
The evolution of lungs	Figure 36.5	301	Negative feedback control of osmotic concentration	Figure 38.18 324
Respiration in frogs	Figure 36.6	302	Chapter 39	
Respiration in birds	Figure 36.7	302	Responding to injury	Figure 39.1 325
The human respiratory system	Figure 36.8	303	Levels of immune protection	Figure 39.2 325
The lining of the upper respiratory tract is adapted to expel particles	Figure 36.9	304	The evolution of immunity	Figure 39.3 326
Alveoli	Figure 36.11	304	Inflammation	Figure 39.4 326
How we breathe	Figure 36.12	305	Complement kills bacteria	Figure 39.6 327
Oxygen and carbon dioxide are exchanged	Figure 36.13	306	Immune cells are diverse	Figure 39.7 327
Breathing control	Figure 36.14	306	Macrophages are antigen-presenting cells	Figure 39.8 328
			Production of antibodies	Figure 39.9 329
			An immune response recognizes many targets	Figure 39.10 330

Antibody structure	Figure 39.11	330	Logistic growth	Figure 42.8	356
Classes of antibodies	Figure 39.12	331	Expanding moose populations	Figure 42.9	356
T cells are the heart of an immune response	Figure 39.13	331	Boom and bust cycles	Figure 42.10	356
Death of a cancer cell	Figure 39.14	332	The human population is growing exponentially	Figure 42.11	357
Rh incompatibility	Figure 39.15	332	Regional trends in future population growth	Figure 42.12	358
How HIV decimates T cell populations	Figure 39.16	333			
Allergy	Figure 39.17	334			
Chapter 40			Chapter 43		
Human sperm	Figure 40.1	335	Fundamental and realized niches	Figure 43.2	359
Embryonic resemblances	Figure 40.2	336	Populations coexist by reducing competition	Figure 43.4	359
Spemann's primary organizer	Figure 40.4	337	Primary succession can yield a deciduous forest after centuries	Figure 43.7	360
Gurdon's experiment	Figure 40.5	338	The Antarctic web of life	Figure 43.10	361
The human male reproductive system	Figure 40.6	339	Energy flow through an ecosystem	Figure 43.11	362
The human female reproductive system	Figure 40.7	340	Pyramids by numbers	Figure 43.12	362
Three types of biological changes make up the menstrual cycle	Figure 40.8	341	The water cycle	Figure 43.13	363
Fertilization	Figure 40.9	342	The carbon cycle	Figure 43.14	364
From ovulation to implantation	Figure 40.10	342	The nitrogen cycle	Figure 43.15	365
Implantation	Figure 40.11	343	The phosphorus cycle	Figure 43.16	366
Neurulation	Figure 40.12	343	Biomagnification in a sampling of wetland organisms	Figure 43.18	367
Early embryos	Figure 40.13	343			
The placenta	Figure 40.14	344	Chapter 44		
Sexual development	Figure 40.15	345	Latitude and altitude influence plant communities	Figure 44.1	368
Labor	Figure 40.16	346	Earth's seasons	Figure 44.2	368
Life stages	Figure 40.17	347	Patterns of air circulation and moisture	Figure 44.3	369
Chapter 41			Earth's major biomes	Figure 44.4	369
Fixed action patterns	Figure 41.3	348	The tropical rain forest	Figure 44.5	370
Releasers elicit specific behaviors	Figure 41.4	348	Tropical dry forest	Figure 44.6	370
Bird migrations	Figure 41.8	349	Tropical savanna	Figure 44.7	370
Fatherhood assured	Figure 41.14	349	Desert	Figure 44.8	370
Zebra social structure reflects habitat	Figure 41.17	350	Temperate grassland	Figure 44.10	371
Chemical cues are important in lobster mating	Figure 41.18	351	Temperate forests	Figure 44.11	371
Bee dances	Figure 41.20	352	Taiga	Figure 44.12	371
Chapter 42			Tundra	Figure 44.13	371
Population dispersion is a basic feature of populations	Figure 42.1	353	Zones of a lake	Figure 44.14	372
Fire ant range	Figure 42.2	353	Rivers change along their course	Figure 44.15	373
Early reproduction leads to fast population growth	Figure 42.3	354	Zones of the ocean	Figure 44.17	373
Survivorship curves show extremes among species	Figure 42.4	354			
Population age structures predict the future	Figure 42.5	355	Chapter 45		
Exponential population growth	Figure 42.6	355	Acid deposition	Figure 45.3	374
A population explosion and crash	Figure 42.7	355	The ozone hole and ultraviolet radiation	Figure 45.4	374
			The greenhouse effect	Figure 45.5	374
			CO ₂ level and global average temperature are correlated	Figure 45.6	375
			Temperate deforestation in the United States	Figure 45.8	375
			A desert spreads	Figure 45.9	376

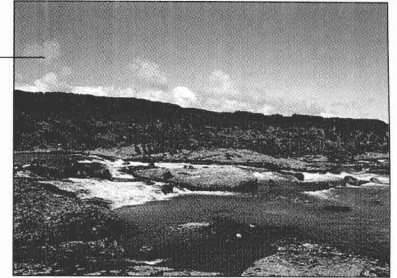


Biosphere

Parts of the planet and its atmosphere where life is possible.

Ecosystem

The living and nonliving environment. (The community of life, plus soil, rocks, water, air, etc.)

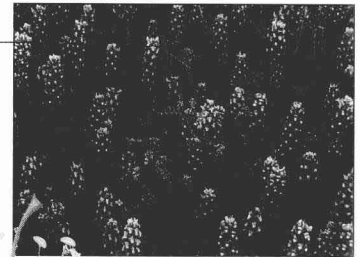


Community

All organisms in a given place and time.

Population

A group of the same type of organism living in the same place and time.



Multicellular organism

A living individual.

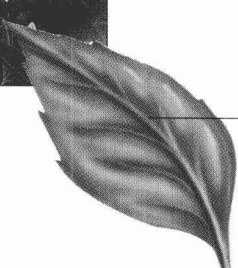
Organ system

Organs connected physically or chemically that function together.



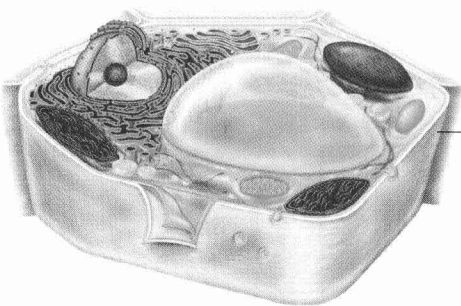
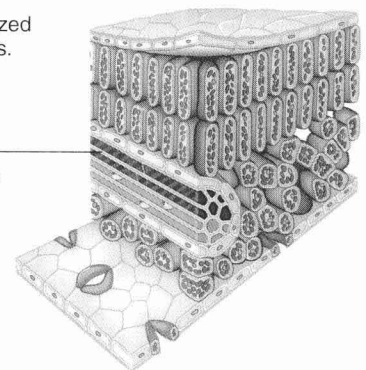
Organ

A structure consisting of tissues organized to interact to carry out specific functions.



Tissue

A collection of specialized cells and the substances they secrete that function in a coordinated fashion.

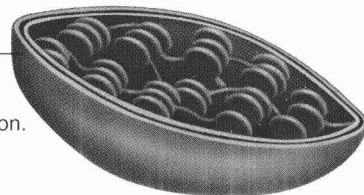


Cell

The fundamental unit of life.

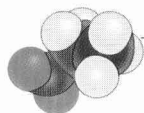
Organelle

A membrane-bounded structure within a complex cell that has a specific function.



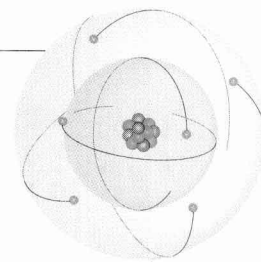
Molecule

A small group of joined atoms. (An amino acid is a building block of a protein.)



Atom

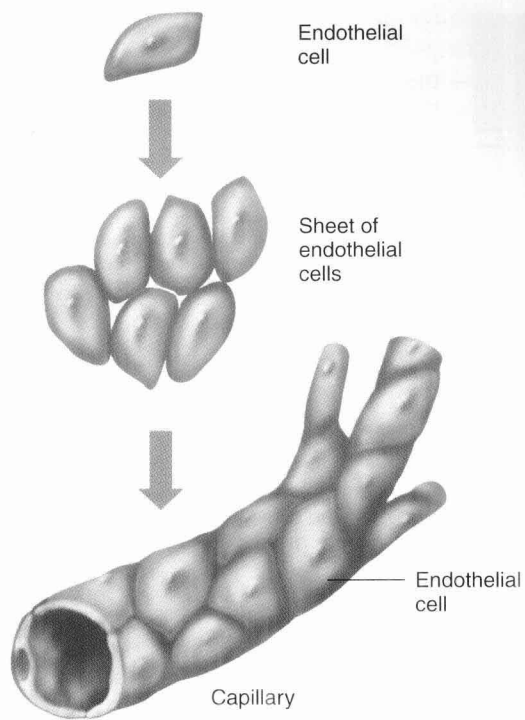
The smallest chemical unit of a type of pure substance (element). Includes protons, neutrons, and electrons.



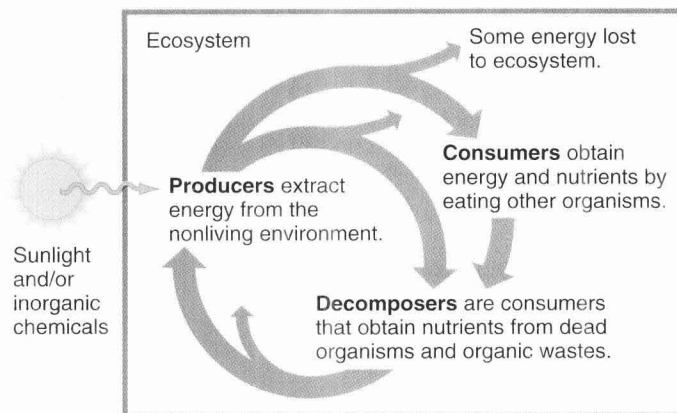
Levels of biological organization reveal common features of all life

Figure 1.1

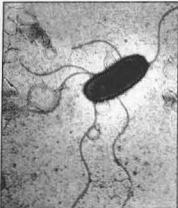
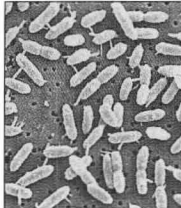




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**An emergent property—
from tiles to tubes**
Figure 1.2



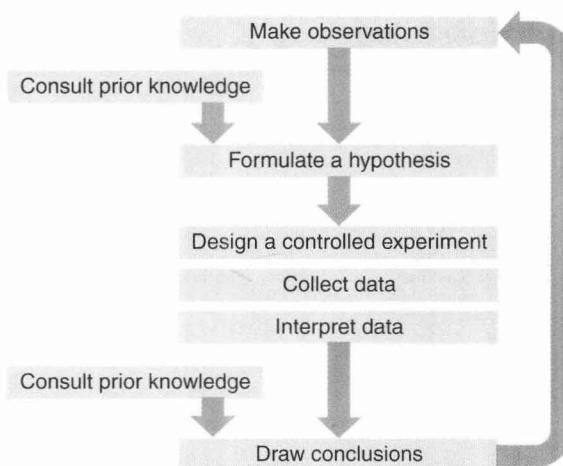
Life is connected
Figure 1.3

Domain					
Bacteria	Archaea	Eukarya			
Kingdom Bacteria	Archaea	Protista	Plantae	Fungi	Animalia
<ul style="list-style-type: none"> • Unicellular • Cells lack nuclei and membrane-bounded organelles • Distinctive cell walls • Some autotrophs • Some heterotrophs 	<ul style="list-style-type: none"> • Unicellular • Cells lack nuclei and membrane-bounded organelles • Distinctive cell walls • Some autotrophs • Some heterotrophs 	<ul style="list-style-type: none"> • Most unicellular • Cells with nuclei and membrane-bounded organelles • Some have cell walls • Some autotrophs • Some heterotrophs 	<ul style="list-style-type: none"> • Multicellular • Cells with nuclei and membrane-bounded organelles • Cell walls of cellulose • Autotrophs (usually) • Complex organ systems 	<ul style="list-style-type: none"> • Most multicellular • Cells with nuclei and membrane-bounded organelles • Cell walls of chitin • Heterotrophs (by absorption) • Tissues 	<ul style="list-style-type: none"> • Multicellular • Cells with nuclei and membrane-bounded organelles • No cell walls • Heterotrophs (by ingestion) • Complex organ systems
 <p><i>Escherichia coli</i></p>	 <p><i>Acidiphilium</i> sp.</p>	 <p><i>Closterium</i> sp. (desmid)</p>	 <p><i>Acer rubrum</i></p>	 <p><i>Coprinus quadrifidus</i></p>	 <p><i>Plusiotis</i> sp.</p>

Organizing Life's Diversity

Figure 1.7

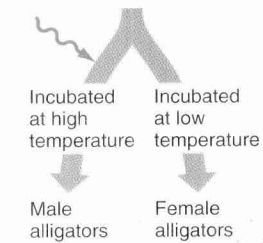
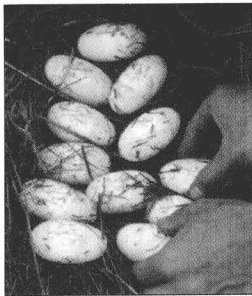
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The scientific method is a means of careful discovery

Figure 1.8

Normal alligator eggs



A

Sample size is the number of eggs used in the experiment.

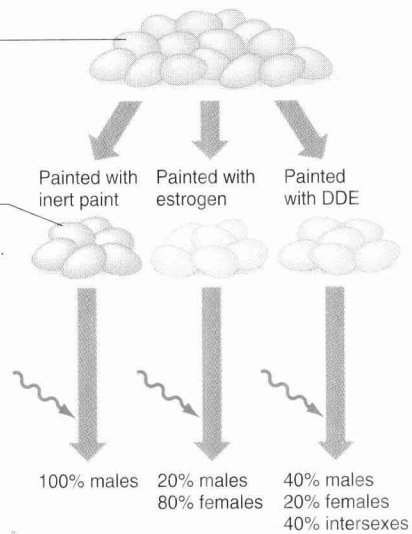
The **control group** consists of eggs painted with inert paint.

The **placebo** in this experiment is inert paint.

The **variables** are DDE and estrogen.

All eggs are incubated at high temperature. The temperature is the **constant** in this experiment.

B



Experiments follow rules

Figure 1.10

A: © Philip Gould/Corbis

1 H																	2 He				
3 Li	4 Be															5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg															13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr				
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe				
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn				
87 Fr	88 Ra	89 Ac	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 ***	111 ***	112 ***										

Bulk biological elements

Trace elements

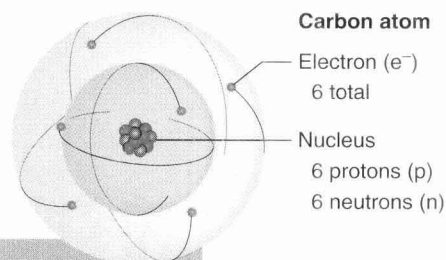
Possibly essential trace elements

*** These elements have not yet been named.

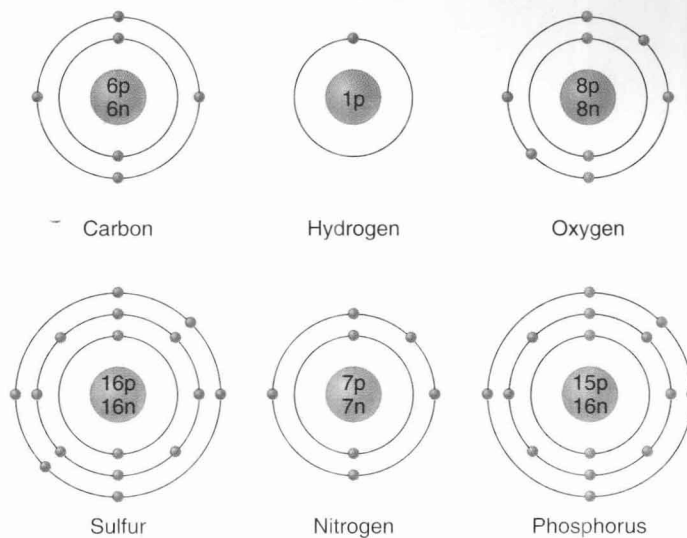
The periodic table of elements
Figure 2.1



Atoms have structure
Figure 2.2

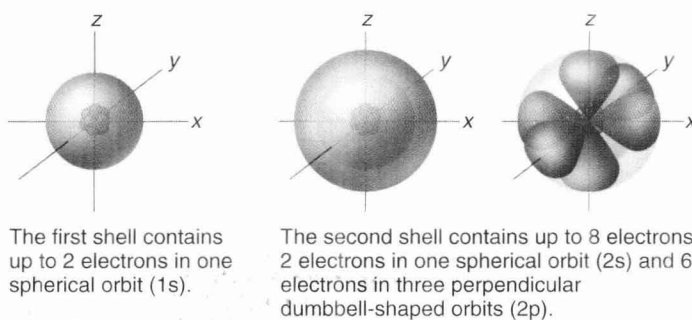


Subatomic particles					
Particle	Charge	Mass	Function	Symbol	Location
Electron	-	0	Bonding	e ⁻	Orbitals
Neutron	0	1	Nuclear stability	n	Nucleus
Proton	+	1	Identity	p	Nucleus



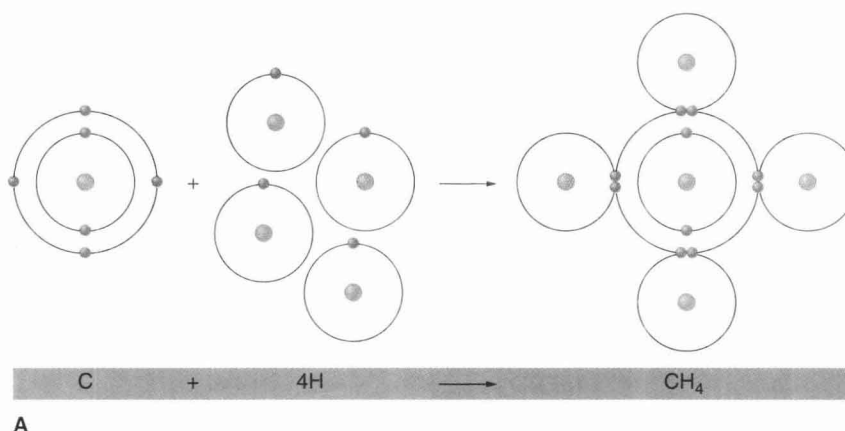
Structures of the atoms prevalent in life

Figure 2.3



Electron orbitals determine molecular shape

Figure 2.4



Covalent bonds form molecules

Figure 2.5