

# Biology in a Box

Each *Biology-in-a-Box* unit consists of exploratory exercises & materials that demonstrate biological principles in an inquiry-based format.

Below is a list of available exercises. Two forms of these exercises can be used:

- 1) Exercises designed for small group exploration (book accompanying materials in the box & files on CD)
- 2) Exercises adapted for teacher-led class exploration (PowerPoint & handout files on CD)

Please make a copy of the CD so that the CD accompanying this box will remain for other teachers using it.

The complete set of exercises is also available online at the *Biology-in-a-Box* website:

<http://eeb.bio.utk.edu/biologyinbox/available.htm>

Unit	Exercises	Grades
<b>1</b> Fossils	1 Fossils True or False	K-12
	2 Historical Relationships: Geological Clock	6-12
<b>2</b> Of Skulls & Teeth	1 Tooth Types & Diet	K-12
	2 Dental Formulas	6-12
	3 Shape has Meaning	9-12
<b>3</b> Fur, Feathers, Scales	1 Animal Covering Match	K-5
	2 Insulation Power	
	a) Thickness & Density	3-12
	b) Feel Test	K-12
	c) Melt Test	3-12
	d) Insulating Mechanisms	6-12
<b>4</b> Simple Measures	1 What Is Mass?	K-5
	2 Mass vs Size, Shape, & Material	K-5
	3 How is volume related to shape?	K-5
<b>5</b> It's in Your Genes	1 Genes are segments of a DNA molecule	
	2 Patterns of Trait Inheritance: Mendel's Laws	
	a) Law of Independent Segregation	
	b) Law of Independent Assortment	
	3 Epistasis	
<b>6</b> Animal Kingdom	1 Graph That Diversity	3-8
	2 Find That Animal	K-12
	3 Relatives of Relatives	6-12
<b>7</b> Backyard Naturalist	1 Who Walked Here?	
	a) Matching Tracks	K-2
	b) Key That Animal	3-8
	c) Getting to Know the Animals Game	6-8
	2 The Scoop on Poop	
	a) Matching Poop with the Pooper	K-2
	b) Using a Key to Identify Animal Scat	3-8
	c) Grouping Scats by Animal Diet	3-8
	3 Bird Songs & Things that Go Bump in the Night	
	a) How many different birds do you hear?	K-5
	b) Identifying Individual Birds	6-12
	c) Identifying Birds in Groups	6-12
	d) Sounds of the Night	K-5
	e) Nocturnal Naturalist	6-12

## Biology in a Box

Unit	Exercises	Grades
<b>8</b> Everything Varies	1 Recognizing Individuals as Unique	K-12
	2 Matching Leaves	K-5
	3 Using Math to Make Decisions about Leaf Variation	
	a) What is the expected value for a trait?	6-12
	b) Comparing the sizes of leaves from two samples	8-12
	4 Shell Match	K-2
	5 Making Sense of Variation: The Matching Game	3-12
	6 Finding Species	6-12
	7 Mechanisms	3-12
<b>9</b> Forestry	1 Dendrology	K-12
	a) Trunk Parts: Tree Rings & Tree Cookies; Leaves & Seeds	K-5
	b) Leaf Key	6-12
	2 Wood Products	
	a) Pick the Products: Matching Wood Chips	K-12
	b) Density & Porosity	6-12
	3 Who Lives Here?	K-5
	4 Forest Growth/Succession	6-12
	5 Pests	9-12
<b>10</b> Behavior	<b>Part I: The Senses</b>	
	1 The Sense of Touch	
	1.1-1.2: The Tactile Box	K-12
	1.3 The Black Box Experiment: Intro to the Scientific Method	3-12
	2 The Chemical Senses: Smell/Olfaction	
	2.1 How Good is Your Nose?	K-12
	2.2 Find That Flower I	3-12
	3 Vision Is a Vibrational Sense	
	3.1 Find That Flower II	3-12
	3.2 a) Slap Snack Alarm	K-12
	3.2 b) Slap Snack Mimic	3-12
	3.3 Jumping Spider Dances:	
	a) Learn a Dance	K-2
	b) Develop an Ethogram	3-12
	c) Comparing Ethograms	8-12
4 Hearing Is a Vibrational Sense		
4.1 Bat Echolocation	K-12	
4.2 The Vibrational Sense of Spiders		
<b>Part II: Environment &amp; Learning</b>		
5 Temperature Effects on Call Rates	3-12	
5.1 Frogs		
5.2 Crickets		
6 T-Maze Experiments for Preference & Learning	3-12	
7 Caching Acorns: A Memory Game	3-12	

## Biology in a Box # 1: Fossils

Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.

Received	Item	Returned	
	1 CD, <i>Biology in a Box</i> Exercises & Files	N	
	1 Teacher Guide		
	32 Chips, dark-colored	N	
	32 Chips, light-colored	N	
	1 Container to hold chips	N	
	1 Magnifying Glass	N	
	1 Shark Jaw, modern, in box	N	
	Exercise #1: Specimens in boxes:	N	
	1 #1 Insects in Amber	N	
	1 #2 Muskrat Jaw	N	
	1 #3 Fern Leaf Impression	N	
	1 #4 Sand Dollar	N	
	1 #5 Clam	N	
	1 #6 Mineral Gypsum	N	
	1 #7 Ghost Shrimp Burrow	N	
	1 #8 Coprolite Specimens (mammal, shark, dinosaur, or turtle)	N	
	1 #9 Coyote Leg Bone	N	
	1 #10 Petrified Wood	N	
	1 #11 Iron Concretion	N	
	1 #12 Dinosaur Tooth	N	
	1 #13 Pottery Sherd	N	
	1 #14 Trilobite	N	
	1 #15 Tooth (bison, shark, or horse)	N	
	1 #16 Vertebra (porpoise or shark)	N	
	1 #17 Coal	N	
	1 #18 Fish Imprint	N	
	1 #19 Stromatolite	N	
	1 #20 Woolly Mammoth Hair	N	
	1 #21 Horsetail Rush	N	
	1 #22 Dinosaur Egg Shell	N	

(Continued on next page)

## Biology in a Box # 1: Fossils, page 2

Received	Item		Returned	
		Bag 4.1: Five Teeth (red dot)	N	
	1	Cretolamna appendiculata	N	
	1	Carcharocles auriculatus	N	
	1	C. chubutensis (or C. angustidens)	N	
	1	C. megalodon	N	
	1	Otodus obliquus	N	
	1	Bag 4.2: Crow Shark Teeth (no dot)	N	

**Please be sure to reseal the container with the Cable Tie before returning.**

Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

***On the back of this sheet, please indicate which exercises you used from this box, and the classes (or grade levels) for which you used them. Also feel free to provide any feedback on your experiences with this box, suggestions for improvement, etc. Thank you!***

## Biology in a Box # 2: Of Skulls & Teeth

*Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.*

Received	Item	Returned	Returned
1	CD, <i>Biology in a Box</i> Exercises & Files	N	
1	Teacher Guide		
1	BBs, box with cup inside	N	
1	Calliper	N	
1	Funnel	N	
1	Graduated Cylinder, 50 ml	N	
1	Protractor	N	
1	Ruler	N	
1	Tooth Type Set	N	
	Skulls	N	
1	#1 Armadillo Skull	N	
1	#2a Prairie Dog Skull OR #2b Rabbit skull	N	
1	#3 Coyote Skull	N	
1	#4 Mink Skull	N	
1	#5 Deer Skull	N	
1	#6 Beaver Skull	N	
1	#7 Turtle Skull	N	
1	#8 Human Skull	N	
1	#9 Bobcat Skull	N	
1	#10 Skunk Skull	N	
1	#11 Porcupine Skull	N	

**Please be sure to reseal the container with the Cable Tie before returning.**

Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

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### Biology in a Box # 3: Fur, Feathers, Scales

Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.

Received	Item	Returned
1	CD, <i>Biology in a Box</i> Exercises & Files	N
1	Teacher Guide	
1	Ice Cube Tray (Prepare ice cubes in advance for Test 2c (fill to 1cm depth & freeze)	N
1	Pail	N
1	Stopwatch	N
1	Thermometer, dial	N
1	Timer	N
10	Ziploc Bags, Large, extra	N
10	Ziploc Bags, Small, extra	N
	Sample Mitts (for Exercises 2B & 2C)	N
1	Aluminum Mitt	N
1	Bubble Wrap Mitt	N
1	Control Mitt	
1	Cotton Mitt	N
1	Fur Mitt	N
1	Ice Cube Mitt (small ziploc)	
1	Leather Mitt	N
1	Plastic Mitt	N
1	Saw Dust Mitt	N
1	Wool Mitt	N
	Body Coverings	N
1	#1 Skunk	N
1	#2 Pheasant	N
1	#3 Rabbit	N
1	#4 Buffalo	N
1	#5 Rattlesnake OR related venomous snake	N
1	#6 Bear	N
1	#7 Coyote	N
1	#8 Alligator	N
1	#9 Parrot	N
1	#10 Sheep	N
1	#11 Turkey	N
1	#12 Bird Foot: Duck, Turkey, Goose	N
1	#13 Mink	N
1	#14 Deer	N
1	#15 Opossum	N
1	#16 Kangaroo	N
1	#17 Goose	N
1	#18 Mountain Goat	N

(Continued on next page)

## Biology in a Box # 3: Fur, Feathers, Scales, page 2

Received	Item	Returned
	Container Samples ( for Exercise 2D)	N
1	Blubber	N
1	Cylinder, Compressed Fur	N
1	Cylinder, Copper	N
1	Cylinder, Fluffed Fur	N
1	Cylinder, Oiled Fur	N
	<i>Keeping Warm</i> -- Exercise 3 Bag contains:	N
1	Dry Erase Board	N
1	Fabric	N
1	Glass	N
1	Insulation	N
1	Linoleum	N
1	Metal	N
1	Plexiglas	N
1	Rock, Polished	N
1	Rubber	N
1	Wood	N

**Please be sure to reseal the container with the Cable Tie before returning.**

Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

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## Biology in a Box # 4: Simple Measures

*Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.*

Received	Item	Returned
1	CD, <i>Biology in a Box</i> Exercises & Files	N
1	Teacher Guide	
1	Balance	N
1	Beaker	N
1	Beetle, Rhinoceros	N
1	Board for Mounting Pulley	N
1	Bucket for Water	N
1	Butterfly, <i>Morpho</i>	N
1	Density Block set or 10 (1 of each):	N
	Acrylic                      Oak	N
	Aluminum                      Pine	N
	Brass                              Poplar	N
	Copper                            PVC	N
	Nylon                              Steel	N
1	Discs, 40 Circular, in a box	N
1	Funnel	N
1	Graduated Cylinder	N
1	Packing Peanuts, White, in box	N
1	Measurement tools in box (Car sticker) - 1 each of:	N
	Cart                                String	N
	Pulley                              Tape Measure	N
	Stopwatch	N
1	Miscellaneous Items in box (spider sticker): hickory nuts, string, acorns, spiny seed pod, stone, cotton ball, feather, paper clips, noodles, plastic cap, felt pad, hexagonal weight, metal washer	N
1	Shells, Bag of 4 Miscellaneous	N
1	Volume Relationship Set: Cube, Rectangular, cone, pyramid, cylinder, & Sphere (Giraffe Sticker)	N
	Weights, Plastic Square, in a box:	N
	4 - 1g Yellow Weights	N
	2 - 5g Orange Weights	N
	1 - 10g Purple Weight	N
	1 - 20g Pink Weight	N
1	Weights, 6 Calibration Standard weights:	N
	1g, 2g, 5g, 10g, 20g & 50g	N

**Please be sure to reseal the container with the Cable Tie before returning.**

Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

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C = Consumables

N = Nonconsumables

Inventory checkout sheets for teachers

4-Measures, page 9

Current as of 1/26/2010

## Biology in a Box # 5: It's In Your Genes

*Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.*

Received	Item	Returned	
	1 CD, <i>Biology in a Box</i> Exercises & Files	N	
	1 Teacher Guide		
	1 Blindfold	N	
	1 Box, GP containing 6 blue chips, 6 red chipd, & 6 white chips	N	
	2 Boxes, F, M: containing 6 red & 6 white chips	N	
	2 Boxes, IF, IM containing 3 thin red chips, 3 fat red chips, 3 thin white chips & 3 fat white chips	N	
	2 Corn Ear, Red	N	
	1 Corn Ear, Red & Yellow	N	
	1 Corn Ear, Yellow	N	
	1 DNA Model, Expandable	N	
	1 Petri Dish, metal (marked Box C)	N	
	1 Puzzle, in Box B	N	
	1 Set of Molecule Building Blocks (plastic) in Box A:	N	
	21 Balls, White	N	
	19 Balls, Black	N	
	4 Balls, Red	N	
	15 Balls, Blue	N	
	13 Tubes, White	N	
	26 Tubes, Colored	N	

**NOTE: Molecular model kits may vary, as we have changed suppliers, and have used different types of kits over time.**

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Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

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## Biology in a Box # 6: Animal Kingdom

*Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.*

Received	Item		Returned	
	1	CD, <i>Biology in a Box</i> Exercises & Files	N	
	1	Teacher Guide		
	1	Game Poster for Phylogenetic Tree	N	
	1	Magnifying Glass	N	
	1	Mystery Animal	N	
	1	Spinner	N	
		<b>Phylum Representatives (set of 20):</b>	N	
	1	#1 Sponge	N	
	1	#2A Jellyfish	N	
	1	#2B Hydra	N	
	1	#2C Coral	N	
	1	#3A Fluke	N	
	1	#3B Tapeworm	N	
	1	#3C Planaria	N	
	1	#4 Roundworm	N	
	1	#5A Clam	N	
	1	#5B Octopus/Squid	N	
	1	#5C Snail	N	
	1	#6A Bristle Worm	N	
	1	#6B Leech	N	
	1	#7A Crustacean	N	
	1	#7B Insect	N	
	1	#7C Spider	N	
	1	#8 Sand Dollar/Starfish	N	
	1	#8B Urchin	N	
	1	#9A Amphioxus	N	
	1	#9B Fish	N	
			N	

**Please be sure to reseal the container with the Cable Tie before returning.**

Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

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## Biology in a Box #7: Backyard Naturalist

*Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.*

Received	Item	Returned	
	1 CD, <i>Biology in a Box</i> Exercises & Files	N	
	1 Teacher Guide		
	1 CD for Unit 7: Bird & Night Animal Songs	N	
	1 Game Cards Set	N	
	1 Sack, Cloth	N	
	1 Ruler	N	
	<b>Set of 18 Animal Footprints:</b>	N	
	1 A: White-Tailed Deer Footprint	N	
	1 B: Red Fox Footprint	N	
	1 C: Mallard Duck Footprint	N	
	1 D: Snapping Turtle Footprint	N	
	1 E: Bull Frog Footprint	N	
	1 F: Fiver Otter Footprint	N	
	1 G: Cougar Footprint	N	
	1 H: Great Blue Heron Footprint	N	
	1 I: Eastern Cottontail Footprint	N	
	1 J: American Crow Footprint	N	
	1 K: Raccoon Footprint	N	
	1 L: Opossum Footprint	N	
	1 M: Gray Squirrel Footprint	N	
	1 N: Canada Goose Footprint	N	
	1 O: Eastern Chipmunk Footprint	N	
	1 P: Muskrat Footprint	N	
	1 Q: Striped Skunk Footprint	N	
	1 R: Mink Footprint	N	
	<b>Set of 8 Poop Samples:</b>	N	
	1 A: White-Tailed Deer Poop	N	
	1 B: Elk Poop	N	
	1 C: Turkey Poop	N	
	1 D: Little Brown Bat Poop	N	
	1 E: Canada Goose Poop	N	
	1 F: Coyote Poop	N	
	1 G: Striped Skunk Poop	N	
	1 H: Cottontail Rabbit Poop	N	

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Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

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Inventory checkout sheets for teachers

7-Naturalist, page 12

Current as of 1/26/2010

## Biology in a Box #8 -- Everything Varies

*Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.*

Received	Item	Returned
1	CD, <i>Biology in a Box</i> Exercises & Files	N
1	Teacher Guide	N
1	Answer Sheet for Exercise 6, Box C	N
2	Answer Sheet for Exercise 6, Box D	N
35	Leaves, Unique in Container A	N
30	Leaves, Species 1 in Container B	N
30	Leaves, Species 2 in Container B	N
31	Shells, Mollusc with red dot on each, Container C	N
30	Shells, Mollusc with blue dot on each, Container D	N
1	Shell, Mystery, in Container E	N
		N
		N

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Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

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## Biology in a Box #9 - Forestry

*Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.*

Received	Item	Returned	
	1 CD, <i>Biology in a Box</i> Exercises & Files	N	
	1 Teacher Guide		
	<b>Dendrology: Trunk Parts &amp; Cookies</b>	N	
	1 Hickory Tree Cookie wedge: B	N	
	14 Leaf Samples	N	
	5 Missing Parts Cards: Picture Cards	N	
	7 Missing Parts Cards: Question Cards	N	
	14 Seed Samples	N	
	1 Tape Measure	N	
	1 Tree Poster	N	
	1 Trunk Diagram	N	
	1 Trunk Puzzle	N	
	1 Tulip Poplar Tree Cookie wedge: A	N	
	<b>Wood Types</b>	N	
	1 Graduated Cylinder	N	
	1 Magnifying Lens	N	
	1 Ruler	N	
	1 Scale	N	
	2 Tree Cores, Porous	N	
	24 Wood Chips, Box	N	
	3 Wood, Density Samples	N	
	<b>Forest Succession</b>	N	
	1 Succession Game Board	N	
	1 External Forces Cards	N	
	Paper Clips	N	
	<b>Who Lives Here?</b>	N	
	1 Forest Illustration	N	
	15 Habitat Cards	N	
	15 Critter Cards	N	
	<b>Wood Product</b>	N	
	Picture Cards of Products	N	
	15 Wood Products, box	N	
	<b>Forest Pests</b>	N	
	Paper Clips	N	
	2 Land Boards	N	
	1 Bark Sample of Beetle Damage	N	

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Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

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Inventory checkout sheets for teachers

9-Forestry, page 14

Current as of 1/26/2010

## Biology in a Box #10 -- Behavior

Please inventory this box immediately upon receipt. If any items are missing, please let your Box Keeper know. Also, please re-inventory the box before returning to your Box Keeper.

Received	Item	Returned
1	CD, <i>Biology in a Box</i> Exercises & Files	N
1	Teacher Guide	
1	CD for Unit 10: Calling Frog Picture on Label	N
6	Tactile Boxes with pictures on each side & hole	N
1	Teacher Box, labeled 1b/1c of extras for Black Box Experiment: Crayons, paper clips, Rubber Balls, Metal Balls, Cotton Balls, Rubber Bands, Marbles, Pennies, Poker Chips, Corks, & Toothpicks.	N
	<b>Black Box Exprmnt- bag w white box sticker:</b>	N
6	Tins, Flat Metal with white paint stripe, each contains: crayon, paper clip, rubber ball, meal ball, cotton ball, rubber band, marble, penny, poker chip, toothpick, & cork	N
6	Magnets	N
	<b>Black Box Exprmnt- bag w black box sticker:</b>	N
6	Tins, Flat Metal with black paint stripe: Do Not Open	N
	<b>Chemical Senses: Smell/Olfaction</b>	
1	<i>Cardboard Box with Nose Sticker containing:</i>	N
6	Jars, Blue	N
6	Jars, Red	N
3	Jars, Dark Green	N
1	Blindfold	N
1	Deely Bobber (headband with balls)	N
1	<i>Cardboard Box with Flower Sticker containing:</i>	N
2	Flowers with tubes	N
	Puff Balls, few	N
1	Straws, bag	N
1	Puff Balls, bag of extra	N
6	Cards, deck of 25, each with sad face	N
3	Cards, deck of 25, labeled <i>Mimic 1</i>	N
3	Cards, deck of 25, labeled <i>Mimic 2</i>	N
	<b>Chemical Senses: Hearing</b>	
1	Box, Plastic, with Spider Web Sticker containing:	N
1	Blindfold	N
1	Wooden block wrapped with monofilament line	N

## Biology in a Box #10 -- Behavior, page 2

Received	Item		Returned
	<b>Environment &amp; Learning</b>		
6	T Mazes in envelop sleeves, all in ziploc bag	N	
6	Acorn Memory Games each containing	N	
	1 Round Mat	N	
	40 Chips, Dominant Color	N	
	6 Chips with acorn sticker, of same color	N	
	4 Chips, Marker, of different color	N	
		N	
		N	

**Please be sure to reseal the container with the Cable Tie before returning.**

Teacher \_\_\_\_\_ School: \_\_\_\_\_ Date: \_\_\_\_\_

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