

## Classifying Living Things

**Procedures:**

1. Obtain a set of organism cards from the instructor
2. Record the card number, organism name, cellular structure, habitat, reproduction method, and the description of the organism.
3. Use the 'Key to the Kingdom's of Life' to determine exactly which kingdom the organism on the first card belongs. Record the number/letter sequence and kingdom name.
4. After the first organism's kingdom is identified, use the appropriate '*Key to the Kingdom \_\_\_\_\_*' sheet to find the name of each creature's phylum and class (if available). Record the Phylum number/letter sequence and name. Record the class information in the data table if available.
5. Repeat steps 2-4 with the other cards.
6. Return all cards to the instructor. Answer the Post-Lab Questions.

<b>Classification of Living Things</b>						
<b>Domain</b>	<b>Bacteria</b>	<b>Archaea</b>	<b>Eukarya</b>			
<b>Kingdom</b>	<b>Eubacteria</b>	<b>Archaeobacteria</b>	<b>Protista</b>	<b>Fungi</b>	<b>Plantae</b>	<b>Animalia</b>
<b>Cell Type</b>	Prokaryote	Prokaryote	Eukaryote	Eukaryote	Eukaryote	Eukaryote
<b>Cell Structures</b>	Cell walls with peptidoglycan	Cell walls without peptidoglycan	Cells walls of cellulose; some have chloroplasts	Cell walls of chitin	Cell walls of cellulose; chloroplasts	No cell walls or chloroplasts
<b>Number of Cells</b>	Unicellular	Unicellular	Most unicellular; some colonial; some multicellular	Most multicellular; some unicellular	Multicellular	Multicellular
<b>Mode of Nutrition</b>	Autotroph or Heterotroph	Autotroph or Heterotroph	Autotroph or Heterotroph	Heterotroph	Autotroph	Heterotroph
<b>Examples</b>	Streptococcus and Escherichia coli	Methanogens and Halophiles	Amoeba, Paramecium, Giant Kelp	Mushrooms and Yeast	Mosses, Ferns, and Flowering Plants	Sponges, Worms, Insects, Fish, and Mammals

Name \_\_\_\_\_ Date \_\_\_\_\_ Hour \_\_\_\_\_ Table \_\_\_\_\_

**Post-Lab Questions:**

1. List two similarities and two differences between the creatures found in the Kingdom Archaeobacteria and Kingdom Eubacteria.

**Similarities:**

**Differences:**

2. Which kingdom(s) include creatures that are **all** multicellular (composed of more than one cell)?
3. Which kingdom(s) include creatures that are **all** unicellular (composed of only one cell)?
4. Which kingdom(s) include creatures that may be multicellular or unicellular and may be microscopic or macroscopic?
5. All living creatures get energy as either heterotrophs (feed on others) or as autotrophs (make their own food). Which kingdom(s) of creatures are **only** heterotrophs?
6. Which kingdom(s) contain **only** autotrophs?
7. Which kingdom(s) contain **both** autotrophs and heterotrophs?
8. Based on the method of getting energy, which kingdom(s) of creatures would be considered *decomposers* and assist in recycling nutrients within a given community of organisms?
9. Based on the method of getting energy, which kingdom(s) of creatures would be considered *producers* and be the base of any food web or chain within a given community of organisms?
10. Based on the method of getting energy, which kingdom(s) of creatures would be considered *consumers* within a given community of organisms?

Name \_\_\_\_\_ Date \_\_\_\_\_ Hour \_\_\_\_\_ Table \_\_\_\_\_

Card Number:	Organism Name:	Cell Structure:	Habitat:	Reproduction:	Description:
Key to the Kingdom Of Life Number/Letter Sequence and Name:					
Phylum(group) Number/Letter Sequence and Name:					
Subphylum name if available:					
Class Name if available:					

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# Key to the Kingdoms of Life

1. a. Organism is unicellular or colonial (containing many single cells); few are multicellular with specialized structures..... Go to 2  
b. Organism is multicellular ..... Go to 4
  2. a. Organism is prokaryotic –(first life); unicellular; has no cell organelles surrounded by membranes ... .. Go to 3  
b. Organism may be unicellular, colonial, or multicellular with visible nuclei... .....Kingdom PROTISTA
  3. a. The prefix *Archae* means ancient; thrive in very harsh environments—hot springs, deep-sea hydrothermal vents, extremely salty or acidic water; get energy for growth from chemicals.....Kingdom ARCHAE BACTERIA  
b. The prefix *Eu* means true; may be a decomposer, a parasite, a symbiont (lives within other creatures and provides them benefits), or photosynthetic (use sunlight to make ‘food’).....Kingdom EUBACTERIA
  4. a. Multicellular; cells have walls ..... Go to 5  
b. Multicellular; cell do not have walls .....Kingdom ANIMALIA
  5. a. Multicellular; cell walls are made of cellulose; are photosynthetic.....Kingdom PLANTAE  
b. Multicellular; cell walls are made of chitin (a tough, flexible carbohydrate); get energy for growth mostly from dead creatures; body formed from tangled, interwoven, thread-like structures called ‘hyphae’ .....Kingdom FUNGI
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Name \_\_\_\_\_ Date \_\_\_\_\_ Hour \_\_\_\_\_ Table \_\_\_\_\_

## Key to the Kingdom ARCHAEABACTERIA

1. a. Organism produces methane gas as a by-product of anaerobic cellular respiration.....group METHANOGENS  
b. Organism does not produce methane gas ..... Go to 2
2. a. Organism can live in water that is very hot (>220°F) and/or very acidic (<pH 2) .....group THERMOPHILES  
b. Organism thrives in water ten times saltier than the ocean; uses salt (NaCl) to produce energy .....group EXTREME HALOPHILES

## Key to the Kingdom EUBACTERIA

1. a. Organisms are microscopic; include many pathogens .....Phylum PROTEOBACTERIA  
b. Individual organisms are microscopic but may form large, visible colonies or long thread-like filaments; most are blue-green in color; are ALL photosynthetic, releasing oxygen as a by-product .....Phylum CYANOBACTERIA



## Key to the Kingdom FUNGI

1. a. Organism's body may be microscopic ..... Go to 2  
b. Organism's body is usually visible to the naked eye; mushroom-shaped or is a cottony mass..... Go to 3
2. a. Reproduction may be asexual or sexual; during sexual reproduction, spores form and develop inside visible sac-like structures called *asci*; asexual reproduction may be by budding..... Phylum ASCOMYCOTA (*Sac fungi*)  
b. Reproduction is only by asexual spores; new fungi develop when environmental conditions are suitable for growth; "athlete's foot" is caused by a fungus belonging to..... Phylum DEUTEROMYCOTA (*Fungi Imperfecti*)
3. a. Body commonly viewed as a cottony mass; reproductive zygosporangia produced inside are colored, lollipop-shaped structures.....Phylum ZYGOMYCOTA (*Common Molds*)  
b. Body is 'mushroom-shaped' (also called 'toadstools'); reproductive spores from inside 'gills' on the underside of the 'cap' .....Division BASIDIOMYCOTA (*Club fungi*)

## Key to the Kingdom PROTISTA

1. a. Organism has the ability to move on its own; does not make its own food..... Go to 2  
b. Organism may or may not move on its own; can make its own food..... Go to 4
2. a. Usually exist as single cells; creatures move using short, hair-like structures called 'cilia' or finger-like projections of the cytoplasm called 'pseudopods' ..... Go to 3  
b. Organism feeds on bacteria and decaying organic matter; when food is plentiful, it forms a web-like, amoeboid structure several centimeters in diameter .....Phylum MYXOMYCOTA (plasmodial slime molds)
3. a. Organism moves using pseudopods .....Phylum RHIZOPODA  
b. Organism moves using cilia .....Phylum CILIOPHORA
4. a. Plant-like; have 2 flagella, no cell walls, may also absorb nutrients from dead organic matter .....Phylum EUGLENOPHYTA  
b. Organism does not have two flagella ..... Go to 5
5. a. May be unicellular or colonial (containing many single cells); cell walls are made of silica (glass)..... Phylum BACILLARIOPHYTA  
b. Organism does not have cell walls made of silica; organism is an algae ..... Go to 6
6. a. Multicellular; most are marine based, generally classified by yellowish-brown color .....Phylum PHAEOPHYTA(*brown algae*)  
b. May be unicellular, colonial or multicellular; contain chlorophyll a and b; most are green in color.....Phylum CHLOROPHYTA (*green algae*)

## Key to the Kingdom PLANTAE

1. a. Organism's body usually small in size; no plant organs, roots, stems, leaves; no special structures for transporting food and water (non-vascular plants).....Phylum BRYOPHYTA (mosses)  
b. Organism's body usually macroscopic; has well-defined organs—roots, stems, leaves; has special structures for transporting food and water (vascular plants) ..... Go to 2
2. a. Reproduces using spores contained inside spore cases on the underside of the 'fronds' (leaves).....Phylum PTEROPHYTA  
b. Reproduces using seeds..... Go to 3
3. a. Seeds produced within cones; seeds not enclosed but are exposed--  
Gymnosperms—meaning 'naked seeds' ..... Go to 4  
b. Seeds not produced within cones, seeds are enclosed –  
Angiosperms—meaning 'enclosed seeds' ..... Go to 6
4. a. Leaves are palm or fern-like in appearance; native habitat is tropical to subtropical regions of the world.....Phylum CYCADOPHYTA  
b. Leaves are not fern-like ..... Go to 5
5. a. Leaves are broad with unique bi-lobed tips; possible link between non-vascular and vascular plants .....Phylum GINKGOPHYTA  
b. Leaves are needle-like; seeds produced inside woody cones; is the dominant(tallest) plant species in northern latitudes .....Phylum CONIFEROPHYTA
6. a. Seeds produced from flowers; seeds enclosed inside dry or fleshy fruits; leaf veins parallel ..... Phylum ANTHOPHYTA ..... Go to 7  
b. Seeds produced from flowers; seeds enclosed inside dry or fleshy fruits; leaf veins branching.....Phylum ANTHOPHYTA ..... Go to 7
7. a. Flower parts in multiples of 3; parallel veins in leaves; fibrous (stringy) root system ..... Class MONOCOTYLEDON  
b. Flower parts in multiples of 4 or 5; branched veins in leaves; 'tap' root system—consisting of one primary root ..... Class DICOTYLEDON

## Key to the Kingdom ANIMALIA

1. a. Creature's body does not have matching left and right sides ..... Go to 2  
 b. Creature's body has matching left and right sides (bilateral symmetry) ..... Go to 4
  
2. a. Body has no specific pattern (amorphous symmetry); tissues and organs not present .....Phylum PORIFERA (*sponges*)  
 b. Body arranged in circular pattern (radial symmetry); groups of cells organized into specialized tissues ..... Go to 3
  
3. a. Groups of cells arranged into stinging tentacles; sac-like gut with only one opening into the body .....Phylum CNIDARIA  
 b. Organs and organ systems present; spines project from body proper; movement is by means of 'tube feet' controlled by a water vascular system..... Phylum ECHINODERMATA (see Kingdom Animalia Class Names)
  
4. a. Body divided into distinct uniform segments ..... Go to 5  
 b. Body may or may not be divided into distinct segments; ..... Go to 8
  
5. a. Body divided into only two or three distinct segments; appendages are jointed; hard outer exoskeleton.....Phylum ARTHROPODA ..... Go to 6  
 b. Body divided into many similar-looking segments; appendages, if present not jointed; soft outer body covering; worm-like appearance .....Phylum ANNELIDA
  
6. a. Body has two distinct segments; generally four pair of walking appendages; no antennae on 'head' region; no wings ; eyes 'simple' not compound ..... Subphylum CHELICERATA (see Kingdom Animalia Class Names)  
 b. Body has three distinct segments; 'head' region has one or two pair of antennae; wings present in some creatures; eyes generally compound ..... Go to 7
  
7. a. 'Head' region has a single pair of antennae; appendages jointed but unbranched; oxygen intake is through small openings in exoskeleton ..... Subphylum UNIRAMIA (see Kingdom Animalia Class Names)  
 b. 'Head' region has two pair of antennae; habitat is water or moist/damp soil; no wings; typically breathe through gills ..... Subphylum CRUSTACEA (see Kingdom Animalia Class Names)
  
8. a. Body cavity has only one body opening; very flat; worm-like appearance ..... Subphylum PLATYHELMINTHES (see Kingdom Animalia Class Names)  
 b. Body cavity has two openings—a mouth and an anus; not worm- like in appearance ..... Go to 9
  
9. a. Body with an internal or external shell; some creatures have tentacles..... Phylum MOLLUSCA (see Kingdom Animalia Class Names)  
 b. Body has no shell; has a dorsal stiffening rod (backbone) made of cartilage or bone; a dorsal nerve cord; gill slits at some point in their development; many with paired appendages..... Phylum CHORDATA..... Go to 10
  
10. a. Elongated, fish-like body; adults have gill slits for breathing .....Subphylum CEPHALOCHORDATA  
 b. Backbone composed of cartilage or bone; skull, brain and dorsal nerve cord present..... Subphylum VERBRATA (see Kingdom Animalia Class Names)

# Key to the Major Kingdoms ANIMALIA Classes

## CHELICERATA:

- Lives exclusively in water; compound eyes located on the side of the head; oxygen intake is by "gill books" .....XIPHOSURA
- May produce "silk"; may have enlarged, pincher-like "touch organs" (palps).....ARACHNIDA

## CRUSTACEA:

- Two pair of antennae, with one very small; bird-like shape .....BRANCHIOPODS
- Two pair of antennae, with on very small; bowling pin-like shape ..... COPEPODA
- Has 10 walking legs; large in size..... MALACOSTRACA

## ECHINODERMATA:

- Has five or more "arms" joined at a common base .....ASTEROIDEA
- Has five thin arms joined at a common base .....OPHIUROIDEA
- Has no arms; long spines project from body .....ECHINOIDEA

## MOLLUSCA:

- Shell may or may not be present; head region distinctive .....GASTROPODA ('stomach-foot')
- Shell, generally internal, tentacles on head .....CEPHALOPODA ('head-foot')
- Shell in two parts .....BIVALVIA ('hatchet-foot')

## PLATYHELMINTHES:

- Parasitic, inside animal intestines, many body segments .....CESTODA

## UNIRAMIA:

- Round, worm-like body; two pair of legs per body segment .....DIPLOPODA
- Flattened, worm-like body; one pair of legs per body segment .....CHILOPODA
- Three body segments; three pair of walking legs; some with wings .....INSECTA

## VERBRATA:

- Internal cartilage skeleton; no jaws; no paired fins, eel-like body .....AGNATHA (jawless fish)
- Internal cartilage skeleton; jaws; external gill slits; paired fins; body covered with tooth-like scales; fertilization internal.....CHONDRICHTHYES (cartilage fish)
- Internal bony skeleton; body usually covered with flattened scales; gills covered; fertilization external.....OSTEICHTHYES (bony fish)
- Internal body skeleton; covered with smooth skin; fertilization external; eggs laid in clusters in water or moist soil ..... AMPHIBIA
- Internal bony skeleton; body covered by water-resistant, dry scales; fertilization internal; lay leathery-shelled eggs.....REPTILIA
- Internal body skeleton; body covered with feathers; no teeth; fertilization internal; lay hard-shelled eggs ..... AVES
- Internal body skeleton; body has hair; fertilization internal; young born alive; female produces milk form glands.....MAMMALIA