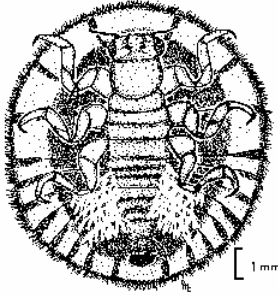


## Animal Diversity II



In the previous lab exercise you learned the principles and practices of developing a classification system and a taxonomic key. You learned about the fundamental characteristics of animals that biologists believe to be important in discerning evolutionary relationships. In this lab exercise, you are introduced to the biological classification system and the classification of animals according to evolutionary relationships as currently perceived by biologists. You will be pleased to see that many organisms are grouped in ways similar to the system that you developed last week.

### Objectives:

1. When you are done, you should understand the basic taxonomic levels and what they mean.
2. You should be able to classify most animals into the correct phylum. You should be able to recognize important or common animals and place them in the correct class.
3. You should be able to use a key to identify (at any taxonomic level) organisms with which you are not familiar.

You should read through the introductory material below *before* lab. You should also read Chapters 24 and 25 in your textbook (Lewis, Gaffin, Hoefnagels and Parker 2002). There is a **pre-lab assignment** on page 13 of this handout to complete **before** coming to lab.

**Always bring your textbook to lab.**

### *Animal Diversity - Introduction*

When we classify organisms, we not only give them names but also place them in a classification system which also tell us something about the organism's relationships. We place organisms in **taxa**, which are levels of classification. For instance, let's classify four different organisms - a painted turtle, a human, a chimpanzee, and a dog:

Taxa	Turtle	Human	Chimp	Dog
<b>Kingdom</b>	Animalia	Animalia	Animalia	Animalia
<b>Phylum</b>	Chordata	Chordata	Chordata	Chordata
<b>Class</b>	Testudomorpha ("Reptiles")	Mammalia	Mammalia	Mammalia
<b>Order</b>	Testudinoidea	Primata	Primata	Carnivora
<b>Family</b>	Emydidae	Hominidae	Hominidae	Canidae
<b>Genus</b>	<i>Chrysemys</i>	<i>Homo</i>	<i>Pan</i>	<i>Canis</i>
<b>Species</b>	<i>picta</i>	<i>sapiens</i>	<i>troglodytes</i>	<i>familiaris</i>

There are several important things to learn from this simple example of classification. First, organisms are placed in taxa with other organisms to which they are related, and the taxa at the higher levels are the largest. For instance, note that our four organisms are all in the same kingdom (Animalia), and the same phylum (Chordata). The turtle, however, is in a different class than the other three. This implies that turtles are less closely related to humans than are the chimps or the dogs. You already knew this; dogs, people and chimps all have hair, nurse their young, and are warm-blooded, while turtles are hairless, cold-blooded, and lay eggs, which they then leave. In turn, note that the dog is in a different order than the human and the chimp; the carnivores are a group of meat-eating mammals, while the primates are primarily insectivores (they eat insects). Humans and chimps in fact are quite closely related; we are in the same family, although in different genera.

Note also that we give each species a two-part name. This actually works a lot like our own names, although reversed from the Anglo-Saxon tradition of the less inclusive name coming first. We write a species name like this: *Homo sapiens*. We put the generic (the more inclusive name) first. For instance, you might think of the Smith family as a 'genus'. Thus, the generic name, Smith, would come before the names of the specific individuals:

Smith John

Smith Mary

Smith Wilma

Smith Fred

Carl von Linné, a Swedish naturalist, popularized the system back in the 1700's. The genus and species names are all in Latin, which was a common language of educated people then (and still is today!). Linné went a little overboard though, like some other superstar scientists of his day he even changed his own name to Carolus Linnaeus (reportedly while obtaining a fake driver's license). Usually, the genus and species name are descriptive of the species under consideration; for instance the dinosaur genus *Triceratops* is named after the characteristic three ('tri') horns ('cerato'), and *Homo sapiens* means wise (sapiens) man (homo). It also used to be common practice to name species after yourself or someone you owed a favor (like a major professor), hence the 'chameleons' you buy at the pet store are called *Anolis carolinensis*, not because they are found in North or South Carolina, but after Carolus Linnaeus.

Most organisms also have common names, the names given to them by the people who deal with them on a daily basis. It is important to note that although a species may have many common names, it can have only one scientific name (composed of the genus and species names); this allows scientists worldwide to know exactly which species is being discussed. Also note that the generic name is capitalized and the specific name is not, and that both are underlined, boldfaced, or italicized to set them off. It is amazing how many people show their ignorance of natural science by ignoring these simple rules! Now you know better.

Back to the classification. The seven taxonomic levels we used (kingdom, phylum, class, order, family, genus, species) are not the only levels used. There are a wide variety of intermediate levels that also may be used (subfamily, superorder, infraclass, subgenus, etc.). The goal of a **taxonomist** (a scientist who classifies organisms) is to arrange a classification that reflects the relationships of the animals as they have evolved over time. Technically, such a classification is a **phylogeny**, which differs from a classification based on other characteristics. For instance, we could have set up five kingdoms based on color ('Red', 'Green', 'Blue', 'Orange', 'Chartreuse), and the phyla based on texture ('Furry', 'Scaly', etc.). Instead, we base all taxa on presumed relationships.

How do we presume these relationships? In large part, they are based on appearance, though with some caution. All animals with keratinous hair are mammals. In the past, a remote ancestor of the mammals became warm-blooded and needed insulation. One type of organism had a mutation in its cells that caused the lizard-like scales on its skin to grow very long and narrow - hairs. Species that have descended (evolved) from this species also have hair, although in some mammals, like whales, it is very sparse. Hair is an advanced feature, at least as compared to the primitive one (scales). We generally take the presence of such advanced features to imply a relationship. Feathers are also modified scales, but unlike mammals, birds also retain some of the primitive scales (on their legs), thus giving away their ancestry as a reptile-like organism.

Another clue to a relationship is a **homologous structure**. These are structures that are derived from the same advanced structure. For instance, fish have two pairs of fins, one pair in front, the other pair in back. The earliest, amphibian-like organisms to walk up on land modified these fins into advanced structures (the technical term for these advanced structures is 'legs'). The legs of birds, mammals, turtles, salamanders, cats, dogs, and frogs (to name a few) have bones which are all homologous, that is, derived from the same structures that first evolved in those early amphibians. Now, here's the fun part. The wings of a bird and the arm of a human also have bones homologous to the bones in the front legs of the other animals we mentioned. See Figure 17-11 in your book for a demonstration of this principle. Even though they do not look alike, the bones in your forearm, the flipper of a porpoise, and the wing of a bird are all derived from the same structure, this strongly implies that you shared a common relative with the birds and porpoises some time in the past, and therefore you should all be put in a common taxa (Phylum Chordata). Note that the fish fin, from which all of these other structures developed, is not advanced, and therefore it is incorrect to say that a fish's fin is homologous with a cat's leg (although many of the bones in the fish's fin are homologous with the bones in a cat's leg).

It is easy to take this principle too far, however. For instance, the wings of a bird and those of a bat are constructed quite differently; on a bat the wing is primarily composed of the fingers, while a bird wing is mainly supported by the arm bones. This tells us that birds and bats, while they share a common ancestor with four legs, are not *closely* related. Insects also have wings, but the wings have no bones, grow out of the back, and are unrelated to the 6 legs of the insect or the fins of fish. Therefore, although a bird and a bee have wings, the wings are not in any way derived from a common ancestor, and thus birds and bees are placed in different phyla (Chordata and Arthropoda). Likewise, the fins of porpoises and fish are similar looking, but not derived from a common ancestor. In such cases, where structures perform the same function, we call them **analogous structures**. A taxonomist must be careful not to use analogous structures as false indications of relationship. Many people believe that whales are fish, for instance, but you now know that such people are merely confused by the analogous structures (fins) that both species bear. We will talk about these strange coincidences later when discussing **convergent evolution**.

Once a classification is worked out, it is possible to develop **keys** to help non-specialists identify the organisms in question. Keys are a formalized, logical way to go about identifying organisms, which are often so numerous that other methods, such as matching up pictures, are too time-consuming. Keys are typically **dichotomous**; that is, the reader is given two choices at each step, and only has to decide on one of the two types. Take the sample key to 'reptiles' below:

1.     With an expanded shell covering the body ..... Turtle  
       Without an expanded shell covering the body ..... go to 2
2.     Without legs or external ear openings ..... Snake  
       With legs and/or external ear openings ..... Go to 3
3.     With large teeth showing externally ..... Crocodilians  
       With small teeth, teeth usually concealed ..... Lizards

Let's say that you have a 'reptile' that you want to identify. This key would help you move from the taxonomic level of the class (reptiles) to that of the orders (turtles, lizards, snakes, etc.). If you had, for instance, a lizard, the first pair of statements would present no problem:

1.     With an expanded shell covering the body ..... Turtle  
       Without an expanded shell covering the body ..... go to 2

Since the lizard does not have a shell like a turtle, you would go on to the second pair of statements (the second couplet), which is numbered '2'. At the second couplet, the legs on the lizard would be a clue to go on to couplet 3, although here you must be careful, because some lizards do not have legs! A secondary character, the ears, will help you in these cases. Finally, at the third couplet, the lack of any large teeth would be an indication that you in fact have a lizard. Often, the couplets will also refer you to pictures to help you make the decisions. It is not unusual for a key to have hundreds of couplets, or to require several keys to make a final determination of the species of the organism in hand.

The vast majority of animals are not in the phylum Chordata, but are in the phylum Arthropoda. In fact, some estimates place 90% of the animal species on Earth in one class - the Insecta. Even within the insects, one group, the beetles, dominates to the extent that one out of every four animal species on the planet is a beetle. This has led some to proclaim that zoology is nothing more than the study of beetles and some minor taxa; one famous philosopher of science, when asked what a study of the natural world revealed about the Creator, replied that the Creator must have "an inordinate fondness for beetles"!

Aside from the Chordates and beetles, there are a wide variety of organisms in the animal kingdom.

### Kingdom Animalia

**Phylum Porifera** - sponges

**Phylum Cnidaria** - anemones, corals, jellyfish

**Phylum Platyhelminthes** - flatworms

**Phylum Nematoda** - roundworms

**Phylum Rotifera** - rotifers

**Phylum Mollusca** - clams, squids, snails, chitons, etc.

**Phylum Annelida** - segmented worms (earthworms et al.)

**Phylum Arthropoda** - crabs, crayfish, insects, etc.

**Phylum Echinodermata** – sea stars (starfish), sea urchins, etc.

**Phylum Chordata** - fish, amphibians, reptiles, birds, mammals

Actually, there are over 45 phyla in the animal kingdom, but, since this is an introductory class, we will stick to these 10. If you get confused about classification, see the **classification scheme** on pages **909** and **910** in your textbook. If you want to learn more about 44 of the phyla, take invertebrate zoology; if you want to learn more about chordates, take vertebrate zoology.

Many authorities divide the phylum Chordata into 7 classes. **You will be responsible for being able to place on sight any vertebrate into the proper class**, including knowing the scientific name of the class (in boldface below).

### Phylum Chordata

**Class Agnatha** - jawless fishes (lampreys)

**Class Chondrichthyes** - cartilaginous fishes (sharks)

**Class Osteichthyes** - bony fishes (bass, goldfish, etc.)

**Class Amphibia** - amphibians (frogs, toads, and salamanders)

**Class Reptilia** - 'reptiles' (turtles, lizards, snakes, and crocodiles)

**Class Aves** - birds

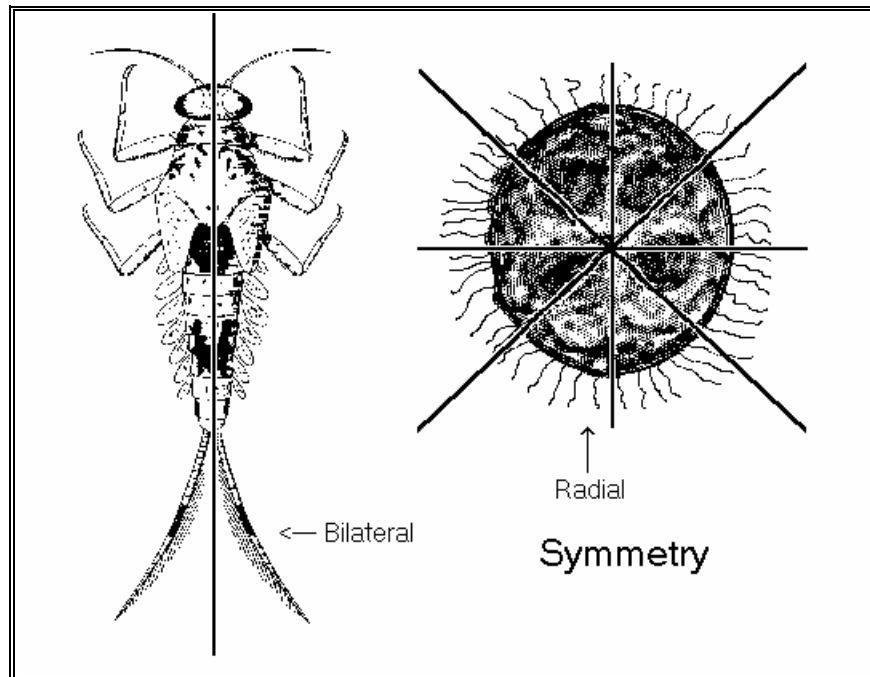
**Class Mammalia** - mammals

### Body Skeleton:

A skeleton is a supporting structure for an animal. It serves to anchor the muscles so that they can work, and, on land, the skeleton helps the animal retain its form in the face of gravity. In the water, most animal tissues are close to the density of water - they neither sink nor float - hence, there is little need for a skeleton to support the body against gravity in aquatic organisms (think of how the water supports your body when you go swimming). On land, however, a skeleton is critical for support. Many organisms have the skeleton on the outside of the body, where it serves both as support and protection. Such an outside skeleton is called an **exoskeleton**, *exo* being the Greek word for outside, and *skeleton* being the Greek word for skeleton. Other organisms, including ourselves, have the skeleton inside the body; this arrangement is known as an **endoskeleton** (*endo*: Greek - inside). Endoskeletons cannot help protect the body, but they are a more practical means of support for larger organisms. In other words, *Godzilla*<sup>TM</sup>, with an endoskeleton, is believable while similarly sized spiders, ants, etc. are not.

### Body Symmetry:

Animals usually have one of two types of body symmetry, although a few have no symmetry at all. The two types are **bilateral** and **radial**; an animal lacking symmetry is **asymmetrical**. A bilaterally symmetrical organism has one and only one plane that divides its body into equal halves. A radially symmetrical organism has more than one plane dividing its body into equal halves. The figure below illustrates the two types of symmetry:



The organism on the left, a mayfly larva (a young insect), has bilateral symmetry; the line illustrates the one plane in which the body can be divided into equal halves. The jellyfish on the right has radial symmetry, with many possible planes of equal division.

### Body Segmentation:

Many organisms, like earthworms, are composed of a series of basically similar units or **segments**. This works fine if all the segments essentially do the same thing. Often, the body may be divided into regions; each region consisting of several segments that resemble each other but differ from segments on other regions. For instance, an insect's body has three regions, the head, thorax, and abdomen. The head of an insect is composed of many segments that have fused into what externally appears to be one segment. The thorax is specialized for locomotion, and these three segments carry legs and/or wings. The abdomen, except for the last few segments, is relatively unspecialized. Crayfish, on the other hand, have a head fused to the thorax (which has 5 segments rather than 3), an abdomen, and a separate region, the tail, at the end of the body.

### Body Appendages:

Like segmentation, appendages (legs, antennae, wings, etc.) also differ from group to group. An invertebrate with wings is an insect. An arthropod with two pairs of antennae is a crustacean. In bilaterally symmetrical animals such appendages are usually paired.

**Body Coverings:**

We use body coverings extensively in our examination of the Chordates. An animal covered with feathers is a bird, a chordate covered with hairs is a mammal. Body coverings are also important in the invertebrates as well. Many insects have hair (although it is chemically different from mammal hair).

***Animal Diversity: A Note on Learning Names***

You may be starting to feel overwhelmed by all the names and terms being thrown at you. This is normal and can easily be overcome. Some of the more successful strategies include learning all the selected key terms at the end of each chapter in the textbook, and all boldfaced words in your lab handouts. Many people find it useful to make flashcards with the name or term on one side and the definition, examples, or a drawing on the back. This system works especially well when you team up and quiz each other.

Biologists have a secret to learning the names. They become familiar with the Greek and Latin root words that are often combined to make up names and terms. Then, when faced with an unfamiliar term, the biologist can often puzzle out what it means. For instance:

Phylum **Porifera** - L. *porus* (pore); *ferre* (to bear) - sponges are porous

Phylum **Cnidaria** - Gr. *knide* (nettle) - cnidarians sting like a nettle

Examples: corals, anemones, jellyfish, *Hydra*.

Phylum **Platyhelminthes** - Gr. *platy* (flat) *helminthes* (worm) - these are flat worms

Examples: Flukes, flatworms, and tapeworms.

Phylum **Nematoda** - Gr. *nematos* (thread); *eidos* (form) - the roundworm is threadlike

Phylum **Rotifera** - L. *rota* (wheel); *ferre* (to bear) - rotifers look like they have a spinning wheel on their 'heads'

Phylum **Mollusca** - L. *mollusca* (soft) - mollusks have a soft body (although many have hard shells)

Class **Gastropoda** - Gr. *gaster* (belly); *podos* (foot) - the 'foot' of a snail is its belly

Class **Bivalvia** - L. *bi* (two); *valva* (folding door) - refers to the two halves of a clam's shell

Class **Cephalopoda** - Gr. *kephale* (head); *podos* (foot) - the 'foot' is very close to the head in octopuses and squids

Phylum **Annelida** - L. *annellus* (little ring) - refers to the ring-like segments of earthworms

Examples: Earthworms, marine worms, leeches.

Phylum **Arthropoda** - Gr. *arthron* (join); *podos* (foot) - refers to the jointed appendages of insects, crustaceans and kin

Subphylum **Chelicerata** - Gr. *chele* (claw); *keras* (horn) – refers to the claws of scorpions

Subphylum **Crustacea** - L. *crusta* (shell) - refers to the hard covering of crabs, etc.

Subphylum **Uniramia** - L. *unus* (one); *ramus* (branch) – unlike Crustaceans, insects and their kin have appendages with only a single branch.  
Examples: Insects, centipedes, and millipedes

Phylum **Echinodermata** - Gr. *echinos* (sea urchin or hedgehog); *derma* (skin) - animals with a spiny skin - a dermatologist obviously studies skin

Examples: Sea stars, brittle stars, sea cucumbers, sea urchins, sand dollars

Phylum **Chordata** - L. *chorda* (cord) - this refers to the notochord

Class **Agnatha** - Gr. *a* (without); *gnathos* (jaw) - the lampreys are jawless fishes

Class **Chondrichthyes** - Gr. *chondros* (cartilage); *ichthys* (fish) - sharks and their kin have cartilaginous, rather than bony, skeletons

Class **Osteichthyes** - Gr. *osteon* (bone); *ichthys* (fish) - the bony fishes

Class **Amphibia** - Gr. *amphi* (double) *bios* (life) - the original superheroes, amphibians lead a double life, first in water, then on land

Class **Reptilia** - L. *reperere* (to creep) - obviously a misnomer - reptiles aren't creepy!

Class **Aves** - L. *aves* (birds) - The Romans knew a bird when they saw one

Class **Mammalia** - L. *mamma* (breast) - ever wonder where the word 'momma' comes from? Mammals suckle their young.

By the way, **you are responsible for knowing** the scientific names (in **boldface**) above, which include the more common phyla and some of the more important classes. You should be able to identify on sight representative specimens to phyla in all cases; in the Chordates you should recognize the classes on sight. You should be able to use a key to identify any organism.

### **A Key to the Animals**

Note: This key is artificial, that is it does not take into account phylogenetic relationships. It also assumes that you have correctly identified the organism as an animal. It will work for most of the animals you will encounter in lab; however, there are many 'oddballs' in the animal kingdom that will be misidentified using this key. It works best for adult organisms although some larval and juvenile forms will key successfully. *To help you learn how to use a key, some parts of the key go into greater depth than you are required to know!*

1. Microscopic, with "wheel" of cilia at head -----> Phylum **Rotifera**  
Macroscopic -----> 2
2. With radial symmetry and tentacles (or leaving a rock-like form  
behind in the dead animals) -----> Phylum **Cnidaria** (3)  
Asymmetrical, bilateral or 5-rayed symmetry -----> 6

#### **Phylum Cnidaria**

3. Life cycle dominated by medusal stage -----> Class Scyphozoa  
Life cycle dominated by attached polyp or floating colony -----> 4
4. A colony of polyps attached to a floating sac of air -----> Class Hydrozoa  
Life cycle dominated by individual or colonial polyps -----> 5
5. Life cycle without medusa, individual or colonial -----> Class Anthozoa  
Life cycle usually with a medusal stage, polyp stage dominant -> Class Hydrozoa

\*\*\*\*\*

6. Sessile, with pores in body, no tissues, spicules present,  
often asymmetrical -----> Phylum **Porifera**  
With 5-rayed or bilateral symmetry -----> 7
7. With 5-rayed symmetry, spiny skin  
(or tubular, with tube feet & tentacles)-----> Phylum **Echinodermata** (8)  
With bilateral symmetry -----> 12

#### **Phylum Echinodermata**

8. With a basal stalk attaching the animal to the substrate -----> Class Crinoidea  
Free living, not attached by a stalk ----->9
9. Body with 5 (or a multiple of 5) arms -----> 10  
Body spherical or tubular -----> 11
10. Arms relatively stout, central disk large -----> Class Asteroidea  
Arms slender, central disk small and distinct -----> Class Ophiuroidea
11. Body spherical or a flattened disk -----> Class Echinoidea  
Body tubular -----> Class Holothuroidea

\*\*\*\*\*

12. Body wormlike or flattened, without scales -----> 13  
Body not wormlike, or wormlike with scales  
(or with multiple gill slits on head) -----> 19

13. Flattened, wormlike body without tentacles or radula -----> 14  
 Rounded, wormlike body, no rows of tube feet-----> 17  
 (if tube feet are present, go back to #8)
14. Body segmented -----> 15  
 Body unsegmented -----> Phylum **Platyhelminthes** [part] (16)
15. Body with hooks on head, parasitic -----> Phylum **Platyhelminthes**,  
 Class Cestoda  
 Body with suckers on head and tail,  
 free living or ectoparasitic -----> Phylum **Annelida**,  
 Class Hirudinea (leeches)

**Phylum Platyhelminthes [part]**

16. Body with suckers, no eyes, parasitic -----> Class Trematoda  
 Body without suckers, often with eyespots, usually free living -> Class Turbellaria

\*\*\*\*\*

17. Unsegmented, rounded, wormlike body -----> Phylum **Nematoda**  
 Segmented body, usually rounded and wormlike -----> Phylum **Annelida** [part] (18)

**Phylum Annelida [part]**

18. With hairlike or other lateral appendages,  
 body not round in cross-section, usually marine -----> Class Polychaeta  
 Without hair, body round in cross-section,  
 usually terrestrial or freshwater -----> Class Oligochaeta

\*\*\*\*\*

19. With segmented limbs or appendages, exoskeleton ---> Phylum **Arthropoda** (20)  
 Limbs or appendages unsegmented, hydro-, exo- or endoskeleton ----> 24

**Phylum Arthropoda**

20. Wormlike, usually with 30 or more legs -----> 21  
 Not wormlike, usually less than 30 legs -----> 22
21. Body rounded, 2 pairs of legs per segment -----> Subphylum **Uniramia**, Class Diplopoda  
 Body flattened, 1 pair of legs per segment -----> Subphylum **Uniramia**, Class Chilopoda
22. With 5 or more pairs of legs,  
       2 pairs of antennae, often aquatic, especially marine ---> Subphylum **Crustacea**  
 With 5 or fewer pairs of legs, at most 1 pair of antennae,  
       often terrestrial -----> 23
23. With 3 pairs of legs, one pair of antennae, often with wings;  
       sometimes without legs and/or antennae -----> Subphylum **Uniramia**, Class Insecta  
 With 4 pairs of legs, no antennae; if 5 pairs of legs then  
       first pair with pincers -----> Subphylum **Chelicerata**

\*\*\*\*\*

24. With two pairs of limbs or fins, sometimes absent (as in snakes  
       and lampreys) with an endoskeleton -----> Phylum **Chordata** (25)  
 Body highly variable, often with antennae  
       or a shell or tentacles -----> Phylum **Mollusca** (37)

**Phylum Chordata**

- |     |   |                                   |
|-----|---|-----------------------------------|
| 25. | Body wormlike, may have fins ----->   | 26                                |
|     | Body with limbs ----->  | 28                                |
| 26. | Aquatic, without jaws ----->  | Class <b>Agnatha</b>              |
|     | With jaws, terrestrial or aquatic ----->                                    | 27                                |
| 27. | Aquatic, with fins ----->   | Class <b>Osteichthyes</b> [part]  |
|     | Terrestrial, with scales (snakes) ----->                                    | Class <b>Reptilia</b> [part]      |
| 28. | Aquatic, with scales (usually), gill slits, and fins ----->                 | 29                                |
|     | Aquatic or terrestrial, if aquatic then without gill slit----->             | 30                                |
| 29. | With one pair of gill slits, usually with scales ----->                     | Class <b>Osteichthyes</b>         |
|     | With more than one pair of gill slits, no scales ----->                     | Class <b>Chondrichthyes</b>       |
| 30. | With smooth skin, 2 pairs of legs, eggs laid in water ----->                | Class <b>Amphibia</b> (31)        |
|     | With scales, hair, or feathers on skin ----->                               | 32                                |
| 31. | Without a tail (in the adult) ----->  | <b>Frogs &amp; Toads</b>          |
|     | With a tail ----->  | <b>Salamanders</b>                |
| 32. | With scales on body, no feathers or hair ----->                             | Class <b>Reptilia</b> (33)        |
|     | With hair or feathers on body ----->  | 36                                |
| 33. | With a shell covering the body ----->                                       | <b>Turtles</b>                    |
|     | Without a shell ----->  | 34                                |
| 34. | Without external ear openings or legs ----->                                | <b>Snakes</b>                     |
|     | With external ear openings, with or without legs ----->                     | 35                                |
| 35. | Snout usually short, teeth small and<br>hidden when mouth is closed ----->  | <b>Lizards</b>                    |
|     | With long snout, large teeth<br>usually visible when mouth is closed -----> | <b>Crocodylians</b>               |
| 36. | With feathers ----->  | Class <b>Aves</b>                 |
|     | With hair (may be very sparse, as on whales) ----->                         | Class <b>Mammalia</b> (not keyed) |

\*\*\*\*\*





This page intentionally blank.

**Animal Diversity: In - Lab Assignment**

-----&gt; Name \_\_\_\_\_

**Complete the following *during* lab:**

- A. Representatives of 6 phyla are located in stations around the laboratory. Using your book (and the key provided above if necessary) list the characteristics of each organism which indicates its classification in that phylum (or class).
- B. At two stations are selections of organisms. At both of these stations, use the taxonomic key provided above to identify the organisms.

**Station A: Phylum: Mollusca**

What are the fundamental distinguishing traits of this phylum? (i.e., what traits do all of the specimens share?)

Class: Bivalvia Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?Class: Gastropoda Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?Class: Cephalopoda Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?**Station B: Phylum: Porifera**

What are the fundamental distinguishing traits of this phylum? (i.e., what traits do all of the specimens share?)

**Station C: Phylum: Chordata**

What are the fundamental distinguishing traits of this phylum? (i.e., what traits do all of the specimens share?)

Class: Agnatha Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?

Class: Chondrichthyes Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?

Class: Osteichthyes Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?

Class: Amphibia Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?

Class: Reptilia Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?

Class: Aves Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?

Class: Mammalia Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this Class?

**Station D: Phylum Cnidaria**

What are the names of the specimens on display?

What are the fundamental distinguishing traits of this phylum? (i.e., what traits do all of the specimens share?)

**Station E: Phylum Arthropoda**

What are the fundamental distinguishing traits of this phylum? (i.e., what traits do all of the specimens share?)

Subphylum: Uniramia                      Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this subphylum?

Subphylum: Chelicerata                      Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this subphylum?

Subphylum: Crustacea                      Specimen name: \_\_\_\_\_  
What are the fundamental distinguishing traits of this subphylum?

**Station F: Phylum: Echinodermata**

What are the names of the specimens on display?

What are the fundamental distinguishing traits of this phylum? (i.e., what traits do all of the specimens share?)

**Taxonomic Key Station 1**

Specimen #: 1 Phylum: \_\_\_\_\_ Class: \_\_\_\_\_

Specimen #: 2 Phylum: \_\_\_\_\_ Class: \_\_\_\_\_

Specimen #: 3 Phylum: \_\_\_\_\_

Specimen #: 4 Phylum: \_\_\_\_\_

Specimen #: 5 Phylum: \_\_\_\_\_ Class: \_\_\_\_\_

**Taxonomic Key Station 2**

Specimen #: 6 Phylum: \_\_\_\_\_ Class: \_\_\_\_\_

Specimen #: 7 Phylum: \_\_\_\_\_ Class: \_\_\_\_\_

Specimen #: 8 Phylum: \_\_\_\_\_ Class: \_\_\_\_\_

Specimen #: 9 Phylum: \_\_\_\_\_ Subphylum: \_\_\_\_\_

Specimen #: 10 Phylum: \_\_\_\_\_ Subphylum: \_\_\_\_\_

## Post-Lab Writing

Due Date: \_\_\_\_\_

Your instructor may assign one or more of the questions below. You should research the paper in the library and/or on the Internet, and support your assertions with documentation. The assignment should be typed; use double spacing. No title page is needed.

\_\_\_\_\_ 1. Type a 1-2 page paper that clearly links evolution to the current classification of organisms. In the paper, give specific examples of characteristics that you observed today in lab which illustrate how organisms are evolutionarily related. You should reference any material gained from another source.

\_\_\_\_\_ 2. Type a 1-2 page paper that compares and contrasts the methods geologists use to classify minerals with those used by biologists to classify organisms. In the paper, you might want to consider why the types of characteristics used are employed by the two groups of scientists. You should reference any material gained from another source.

\_\_\_\_\_ 3. Type a 1-2 page paper that clearly shows why the forelimbs of birds and bats are both analogous and homologous, even though the wings of birds and bats are analogous but not homologous. You should reference any material gained from another source.

\_\_\_\_\_ 4. Type a 1-2 page paper that explains several uses of taxonomy in the modern world. Your paper should include your own thoughts as well as information gleaned from your textbook *and other sources*. You should reference any material gained from another source.

\_\_\_\_\_ 5. Type a 1-2 page paper that examines one characteristic — skeleton, symmetry, body covering, etc. — across all of the phyla studied this week. Your comparisons should include both external observations of the organisms that you made during the labs, and information gleaned from your textbook *and other sources*. You should reference any material gained from another source.