

Lab # 6 on Taxonomy and the Animal Kingdom

Pre Lab Questions:

1. Name one pro and one con for the use of taxonomy in Biology?
2. Name 3 domains and 4 eukaryotic kingdoms.
3. From least to most inclusive, list the following terms:
class, kingdom, phyla, genus, order, domain, species
4. Matching the phyla with the correct member of that phyla
Cnidaria a) flat worms
Platyhelminthes b) sponges
Chordata c) jelly fish
Annelida d) eagle
Porifera e) star fish
f) leech

Taxonomy

The science of naming things.

- kingdom, phylum, class, order, family, genus, species
- King Paul called out for Gus and Sam,

The 3 Domain System

- Based on differences in the sequences of nucleotides in the cell's
 - rRNA,
 - as well as the cell's membrane lipid structure
 - and its sensitivity to antibiotics.
 - rRNA molecules throughout nature carry out the same function, their structure changes very little over time. Therefore similarities and dissimilarities in rRNA nucleotide sequence are a good indication of how related or unrelated different cells and organisms are.
- ❖ This system proposes that a common ancestor cell ("Cenancestor") gave rise to three different cell types, each representing a domain.
- ❖ The three domains are the Archaea (archaebacteria), the Bacteria (eubacteria), and the Eukarya (eukaryotes).
- ❖ The Eukarya are then divided into 4 kingdoms: Protists, Fungi, Animalia, and Plantae.

The Five Kingdom Classification

- ❖ Monera (prokaryotes)
- ❖ Protista (single celled Eukaryotes)
- ❖ Fungi
- ❖ Animal

A species represents one type of organism.

Binomial Nomenclature: Genus + species. Species names are always underlined or written in italics



Lab 6: An Introduction to Animal Diversity

Most people, when they think of animals, think of those similar to ourselves: dogs, cats, horses, apes, tigers and other mammals. However, the Kingdom Animalia is in fact a very diverse one, with mammals being just a minor group in terms of numbers of species. Actually, in terms of diversity and numbers, the Arthropods are far and away dominant and arguably the most important group ecologically. This lab features some of the more common animal phyla. Work in pairs, using this handout as a guide to examine the names, characteristics and examples from each of the phyla represented. Major characteristics are provided. Also, space is available for you to sketch representative

members of this kingdom and take additional notes.

Animal Kingdom Major characteristics:

Major ecological roles:

Commercial, economic and medical importance to us:

Taxonomy:

- Kingdom
- Phylum
- Class
- Order
- Family
- Genus
- Species

In today's lab, you will examine some of the phyla in the Animal Kingdom. At the end of today's lab you should be able to name these phyla, give their general characteristics, and be able to place an animal into its correct phylum. You will also learn some of the classes in the phyla Arthropoda and Chordata.

| Phylum Name | Description |
|------------------------|---|
| Porifera | <p>No tissues, organs, nervous system, appendages Most aymmetrical (a few radial) Have internal skeleton of CaCO_3 or silica Filter feeders by circulating water through pores</p> <p>Sponges</p> |
| Cnidaria | <p>Jellyfish, anemones, Hydra, corals</p> <p>Radial symmetry Two body plans: polyp and medusa</p> <ul style="list-style-type: none"> Polyp: sessile (stalked as Hydra, anemones) Medusa body plan (jellyfish) <p>Loose tissue layers Stinging cells for offense/defense (some stings are lethal to humans), Cnidaria = nettle</p> <p>Corals make reefs of CaCO_3 which they secrete around their soft bodies: very, very important ecologically and economically.</p> |
| Platyhelminthes | <p>Flatworms, flukes, tapeworms</p> <p>Many parasitic, some free-living (usually aquatic) Primitive nervous system (except tapeworm) Incomplete digestive system (what goes in comes out of same opening) 1st to show bilateral symmetry with cephalization (head formation)</p> |
| Nematoda | <p>Unsegmented round worms Both parasitic and free living No true body segmentation Bilateral symmetry Complete digestive tract (mouth to anus) Primitive nervous system</p> <p>Trichinella (parasite of us, pigs), Ascaris (intestinal round worm), Tubatrix (the vinegar eel), Soil nematodes such as <i>Caenorhabditis elegans</i> (genetics studies)</p> |

| Phylum Name | Description |
|-------------------|--|
| Mollusca | <p>Clams, snails, mussels, slugs, abalone, squid, octopus etc</p> <p>Body enclosed in a thin mantle that secretes a shell of one, two or eight parts. (ie: snail=1, clam=2, chiton=8)</p> <p>Have ventral muscular foot modified for crawling (as a snail), burrowing (as a clam), or swimming (as a squid).</p> <p>Mollusca = stomach foot</p> <p>Complete digestive tract, nervous system with nerve ganglia, capable of fine, directed movement</p> <p>Squid, octopus are especially smart</p> <p>Most with a radula (feeding structure with rows of teeth) Used either for scraping up food (snail) or grasping prey (squid)</p> <p>Most free living (not parasitic), most marine</p> |
| Annelida | <p>Segmented worms: earthworms, leeches, marine worms</p> <p>Segmented bodies composed of many similar and ring-like segments, Annelida= little ring</p> <p>This segmentation is visible externally and internally</p> <p>Move by use of fluid filled hydrostatic skeleton</p> <p>Bilateral symmetry</p> <p>Complete digestive tract, closed circulatory system (blood flows thru discrete vessels)</p> <p>Most free living: earthworms, marine worms</p> <p>Some ectoparasitic: leeches</p> |
| Arthropoda | <p>85% of animal kingdom</p> <p>Biggest, most diverse and most important phylum</p> <p>Contains >1 million species</p> <p>Body usually segmented</p> <p>Exoskeleton made of chitin (proteinaceous, hard, impermeable covering), bilateral symmetry, complete digestive tract, elaborately jointed appendages</p> <p><u>3 major classes</u></p> <ul style="list-style-type: none"> • Crustacea: crabs, shrimps, lobsters, crayfish, barnacles; 10+ appendages, most marine • Arachnida: spiders, scorpions, ticks, mites, body in 2 major segments, 8 legs, wingless • Insecta: grasshoppers, flies, moths, butterflies, beetles, bees, lice, etc. Most abundant, diverse & widespread of all animals, body in 3 major segments (head, thorax, abdomen), 6 legs, most winged as adults |

| Phylum Name | Description |
|---------------------------------|--|
| Echinodermata | Seastars, urchins, sand dollars, brittle stars, sea cucumbers Radial symmetry as adults, larvae are bilateral No head, brain segmentation, skin with tiny projections Show some chordate characteristics embryologically |
| Chordata | Fish, amphibians, reptiles, birds, mammals At some point in their life cycles, all chordates have a dorsal nerve cord running down the back, a notochord (supporting rod made of cartilage lying just beneath the nerve cord), and pharyngeal gill slits |
| Subphylum Vertebrata | Most chordates are in this group Backbone or vertebral column INCLUDES THE FOLLOWING CLASSES: |
| CLASSES of vertebrates : | Chondrichthyes: sharks and rays. Fish w/ cartilaginous skeletons, not bone |
| | Osteichthyes: trout, salmon, goldfish, Have a bony skeleton, gills covered by operculum |
| | Amphibia: frogs, toads, newts, salamanders Have dual life: adults usually terrestrial, larvae are aquatic with gills, most thin skinned, eggs without shells First vertebrates to live out of water New features for life on land include legs, lungs (not in all), nostrils Ectothermic (body temp varies according to outside, environmental temp) |
| | Reptilia: lizards, snakes, turtles, tortoises, crocs and alligators, dinosaurs 1st vertebrates completely adapted to terrestrial living Shelled, amniotic eggs (no need to lay eggs in water) Thick, scaly skin retards water loss Limbs capable of rapid locomotion (lacking in snakes) Ectothermic with behavioral temperature regulation Internal fertilization (why important for land dwellers?) |

| | |
|-----------------------------|---|
| More classes of vertebrates | <p>Aves: birds</p> <p>Feathers (same derivation as reptile scales)</p> <p>Endothermic (constant body temp maintained at high cost)</p> <p>Front limbs modified for flight (wings) in most</p> <p>Skeleton with hollow, air-filled bones (reduces weight)</p> <p>No teeth (have lighter beaks)</p> <p>Sternum (breast bone) enlarged with median keel for attaching wing muscles</p> <p>Very efficient lung/air sac system – useful for energy costs of flight</p> <p>Usually show high parental investment</p> <p>Internal fertilization, lay eggs</p> |
| | <p>Mammalia: rodents, bats, cats, dogs, horses, cattle, pigs</p> <p>Mammary glands on females provide milk (also found on males but not functional)</p> <p>Have fur/hair (even on whales)</p> <p>Usually show high parental investment</p> <p>Endothermic with generally stable body temp, except in hibernators</p> |

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| Post Lab 6 Test QUESTIONS |
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A. Which phylum do the following animals belong to?

1. black widow spider
2. Siberian tiger
3. tape worm
4. seagull
5. sea urchin
6. sponge

B. Biologists divide animals into vertebrates and invertebrates (animals without a backbone). Which of the animals listed above are invertebrates?**C. Describe an ecological role for the following organisms:**

- a) earthworms
- b) coral
- c) sea anemone

D. Your friends tell you that they are confused between 2 words: arachnid and arthropod. Explain the difference to them.

E. Which class does each of the following animals belong to?

- a) horse
- b) sting ray
- c) bald eagle
- d) dolphin
- e) dinosaur**

F. Name 1 more class of vertebrates not mentioned above and give an example.

G. What are the characteristics of mammals?

H. What general characteristics do organisms in both the animal and plant kingdom share? What characteristics don't they share?