UNIT 4: EVOLUTION  TOPIC D: CLASSIFICATION  TOPIC E: BIODIVERSITY

4D Essential Idea(s)
- Species are named and classified using an internationally agreed system.

IB Assessment Statements and Class Objectives:

5.3.U3: Taxonomists classify species using a hierarchy of taxa.
- Define taxon and taxonomist.
- List the hierarchy of taxa, from largest to smallest.

5.3.U4: All organisms are classified into three domains (archaea, eubacteria and eukaryote).
- List the three domains of life.
- State the two groups of prokaryotes.
- Draw a tree diagram to illustrate the evolutionary relationship between organisms of the three domains.

5.3.U5: The principal taxa for classifying eukaryotes are kingdom, phylum, class, order, family and genus and species.
- List the four kingdoms of eukaryotes.
- List the hierarchy of taxa, from largest to smallest.

5.3.U2: When species are discovered they are given scientific names using the binomial system.
- Define binomial nomenclature.
- State three rules of binomial nomenclature formatting.

5.3.U1: The binomial system of names for species is universal among biologists and has been agreed and developed at a series of congresses.
- Outline the role of botanical and zoological congresses in the naming of plants and animals.

4E Essential Idea(s)
- The identification of organisms can be aided with the use of a dichotomous key.

IB Assessment Statements and Class Objectives:

5.3.A2: Recognition features of bryophyta, filicinophyta, coniferophyta, and angiospermophyta.
- State the four major plant phyla.
- Outline the differences between the four major plant phyla in regard to external recognition features.

5.3.A3: Recognition features of porifera, cnidarian, platyhelminthes, annelida, mollusca, arthropoda, Echinodermata, arthropoda and chordata.
- State nine major animal phyla.
- Outline the characteristics of the eight major animal phyla (outside of chrodata).

5.3.A4: Recognition of features of birds, mammals, amphibians, reptiles and fish.
- Contrast chordate and vertebrate.
- State five major classes of chordata.
- Outline the characteristics of five major vertebrate classes.

5.3.S1: Construction of dichotomous keys for use in identifying specimens.
- Explain the use of a dichotomous key in the identification of a specimen.
UNIT 4: EVOLUTION  

TOpic D: CLASSIFICATION  

TOpic E: BIODIVERSITY  

**Domains**

- **Eukaryota**  
- **Archaea**  
- **Bacteria**  

**Pneumonic:**  **King Philip Came Over For Great Spaghetti**

**Kingdom**

- **Animals**  
- **Plants**  
- **Fungi**  
- **Protists**  
- **Bacteria**  
- **Archaea**

**Example – Grizzly Bear**

- Kingdom: **Animalia**  
- Phylum: **Chordata**  
- Class: **Mammalia**  
- Order: **Carnivora**  
- Family: **Ursidae**  
- Genus: **Ursus**  
- Species: **horibilis**

**Binomial Nomenclature:**

- **Genus species**  
- Human: **Homo sapiens**  
- Grizzly bear: **Ursus horibilis**
Types of Plants Chart

<table>
<thead>
<tr>
<th>PLANT TYPE</th>
<th>Bryophyta</th>
<th>Filicinophyta</th>
<th>Coniferophyta</th>
<th>Angiospermophyta</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHAT IS IT?</td>
<td>mosses</td>
<td>ferns</td>
<td>trees</td>
<td>flowering plants</td>
</tr>
<tr>
<td>KEY CHARACTERS</td>
<td>• no vascular tissue • spores • no flowers • no seeds • prefer moist habitats</td>
<td>• large leaves • uncurling of leaves • spores</td>
<td>• gymnosperms • woody • shrubs • cones with seeds</td>
<td>• largest group • seeds</td>
</tr>
</tbody>
</table>

Use the Internet to look up the four main characteristics that define an animal. Outline them below.

- multicellular
- heterotrophic
- eukaryotic
- lack cell walls

Use the Internet to look up the difference between a chordate and an invertebrate. Describe the difference below. Also, include the percentages of animals that fit in each category.

~95% invertebrate (simple, no backbone)
~5% vertebrate/chordate (backbone)
### Types of Animals Chart (Invertebrates ONLY)

<table>
<thead>
<tr>
<th>PHYLUM</th>
<th>Cnidarian</th>
<th>Platyhelminthes</th>
<th>Nematoda</th>
<th>Annelida</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMPLES</td>
<td>jellyfish, sea anemones, hydras, corals</td>
<td>flatworms</td>
<td>roundworms</td>
<td>earthworms, marine worms, leeches</td>
</tr>
</tbody>
</table>
| KEY CHARACTERS | aquatic, soft-bodied, carnivorous, radial, stinging tentacles, independent or in colonies | soft, unsegmented, flattened, very thin | unsegmented, some aquatic, some parasites | segmented, "little ring"

<table>
<thead>
<tr>
<th>PHYLUM</th>
<th>Arthropoda</th>
<th>Mollusca</th>
<th>Echinodermata</th>
<th>Porifera</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMPLES</td>
<td>spiders, centipedes, insects, crustaceans</td>
<td>snails, slugs, clams, squid, octopi</td>
<td>sea stars, sea urchins, sea dollars</td>
<td>sponges</td>
</tr>
<tr>
<td>KEY CHARACTERS</td>
<td>&quot;joint foot&quot;, segmented, exoskeleton, jointed appendages, large group</td>
<td>soft-bodied, shell, larvae (free-swimming)</td>
<td>&quot;spiny skin&quot;, live in sea, internal skeleton, tube feet, radial</td>
<td>pore bearers, tiny openings all over body, most ancient, simplest</td>
</tr>
</tbody>
</table>

In addition to these 8 phyla, there is one additional phyla called Chordata. Continue onto the next page to continue learning about this final Animal phylum.
### Types of Animals (CHORDATES ONLY)

<table>
<thead>
<tr>
<th>CLASS</th>
<th>EXAMPLES</th>
<th>KEY CHARACTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td>pigeon, dove,</td>
<td>feathers, lay eggs, wings - not all fly, backbone, warm-blooded</td>
</tr>
<tr>
<td></td>
<td>finch, sparrow,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>wren</td>
<td></td>
</tr>
<tr>
<td><strong>Amphibians</strong></td>
<td>frog, salamander, newt, toad</td>
<td>cold-blooded, backbone, no scale, land + water habitats</td>
</tr>
<tr>
<td><strong>Reptiles</strong></td>
<td>snake, turtle, lizard, alligator, crocodile</td>
<td>backbone, scales, breathe with lungs, most lay eggs, cold-blooded</td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td>guppy, carp, catfish, shark, goldfish</td>
<td>water habitat, backbone, breathe with gills, cold-blooded, scales</td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td>rodent, primate, bat, bear, deer</td>
<td>vertebrates, warm-blooded, hair, produce milk, live young</td>
</tr>
</tbody>
</table>
### Dichotomous Key:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. dog</td>
<td><em>Canis familiaris</em></td>
<td>8. canary</td>
<td><em>Serinus canaria</em></td>
</tr>
<tr>
<td>2. shark</td>
<td><em>Carcharodon carcharias</em></td>
<td>9. oyster</td>
<td><em>Haematopus ostralegus</em></td>
</tr>
<tr>
<td>3. rose</td>
<td><em>Rosa sylvestris</em></td>
<td>10. mosquito</td>
<td><em>Ochlocrocorus tauriophilus</em></td>
</tr>
<tr>
<td>4. skunk</td>
<td><em>Mephitis mephitis</em></td>
<td>11. mushroom</td>
<td><em>Boletus edulis</em></td>
</tr>
<tr>
<td>5. turkey</td>
<td><em>Meleagris gallopavo</em></td>
<td>12. cow</td>
<td><em>Bos taurus</em></td>
</tr>
<tr>
<td>6. dolphin</td>
<td><em>Tursiops truncates</em></td>
<td>13. pine tree</td>
<td><em>Pinus ponderosa</em></td>
</tr>
<tr>
<td>7. eagle</td>
<td><em>Haliaeetus leucocephalus</em></td>
<td>14. ivy</td>
<td><em>Rhus toxicodendron</em></td>
</tr>
</tbody>
</table>

Find and match the scientific names of the organisms’ common names using the following key:

1. animal
   - not an animal: go to 2
   - go to 11
2. has wings
   - no wings: go to 3
   - go to 6
3. has feathers
   - no feathers: go to 4
   - *Ochlocrocorus tauriophilus*
4. flies high
   - does not fly high: go to 5
   - *Meleagris gallopavo*
5. often yellow
   - not yellow: go to 9
   - *Haliaeetus leucocephalus*
6. lives in water
   - lives on land: go to 9
   - go to 7
7. has fluffy fur
   - no fluffy fur: go to 8
   - *Bos taurus*
8. common pet
   - not a common pet: go to 2
   - *Canis familiaris* ✔
9. has fins
   - no fins: go to 10
   - *Haematopus ostralegus* ✔
10. razor sharp teeth
    - pegged, pointy teeth: go to 11
    - *Carcharodon carcharias* ✔
11. green
    - not green: go to 12
    - go to 13
12. grows tall
    - does not grow tall: go to 13
    - *Pinus ponderosa* ✔
13. can be poisonous
    - not poisonous: go to 8
    - *Boletus edulis* ✔