



Lesson Objectives

By the end of this lesson, you should be able to:

- Explain the purpose of biological **taxonomy**.
- Describe how organisms are **classified**.
- Explain reasons why **systems** of classification may change.

Science Practice: Organize data using specific **grouping** methods.



Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

taxonomy	the science of naming and classifying organisms based on structural comparisons and genetic evidence
phylogenetic tree	a chart that depicts an evolutionary relationship among organisms
binomial nomenclature	a two-word system designed by Linnaeus for naming organisms using the genus name followed by the species name

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Lesson
Question

How are organisms classified?

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Classification

Taxonomy is the science of naming and classifying organisms

based on:

structural comparisons.

genetic evidence.

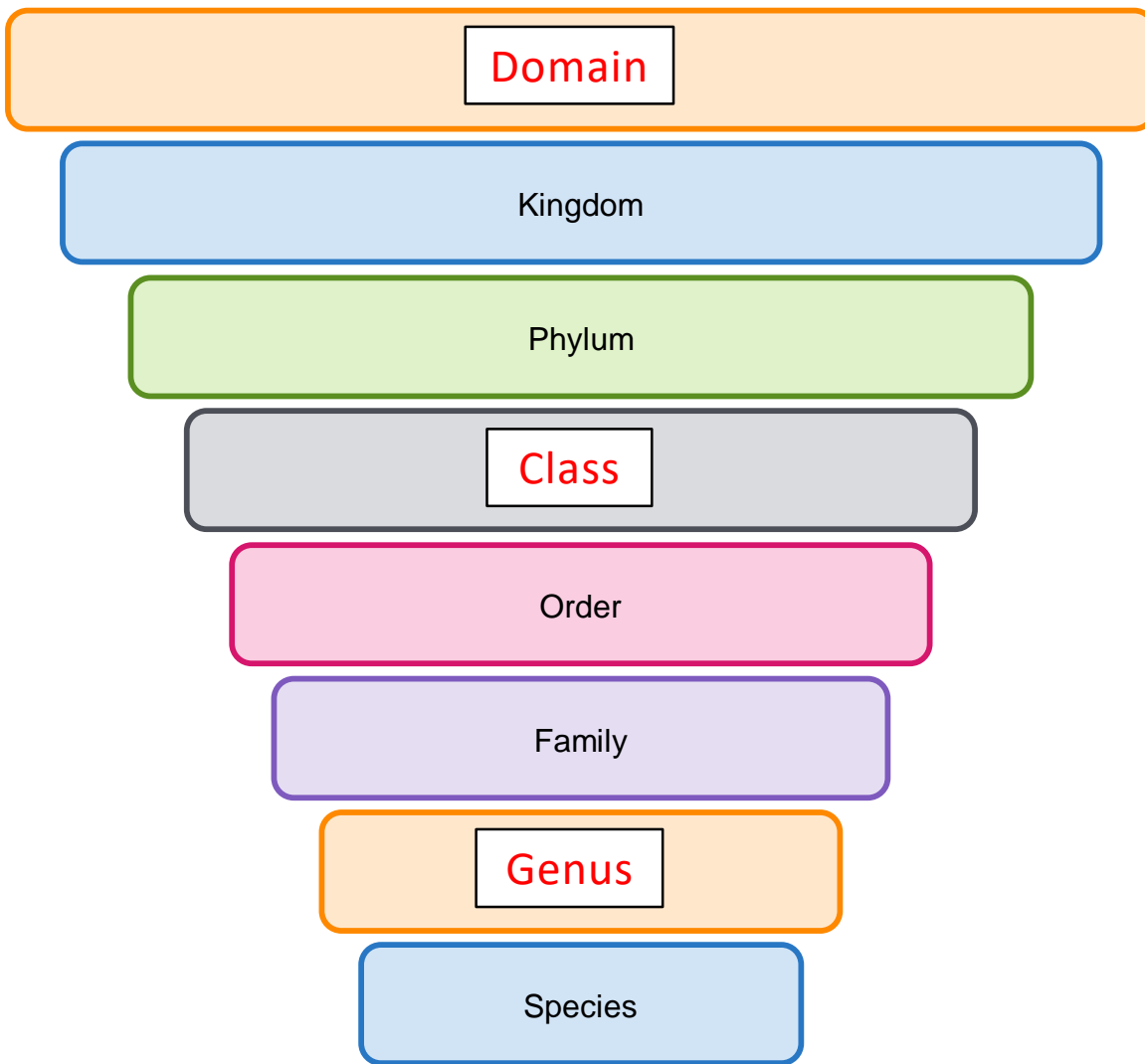
Use this sentence to help you remember the levels of classification:

Dashing King Phillip Came Over For Great Spaghetti

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Complete the classification scheme.



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Common Names

- Not always **physically** accurate
- Can be applied to **multiple** organisms
- Multiple common names can be applied to the same **organism**
- Differ among various **locations**
- Do not always translate **accurately**

Naming Organisms: The Honeybee

<i>Apis pubescens, thorace subgriseo, abdominae fusco, pedibus posteuis, glabris, untrunque margine ciliatis</i>	
<i>Apis pubescens</i>	bee with soft short hairs
<i>thorace subgriseo</i>	gray chest
<i>abdominae fusco</i>	dark brown abdomen
<i>pedibus posteuis</i>	Legs with no hair
<i>glabris, untrunque margine ciliatis</i>	small sacs with hairlike outgrowths along the edge

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Linnaeus's Naming Method

Binomial nomenclature is Linnaeus's two-word system for naming organisms using the genus name followed by the species name.

- **Latin** provides a common language:

*Apis pubescens, thorace subgriso, abdomine
fusco, pedibus posticis glabris, untrinque
marginis ciliatus*

↓
Apis mellifera

Circle the genus and underline the species in the Linnaean name for the bee above.

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Physical Classification: Comparing Structures

The **platypus** has characteristics similar to birds and mammals.

Birds have bills or beaks and lay eggs.

Mammals have hairy bodies and produce milk for offspring.

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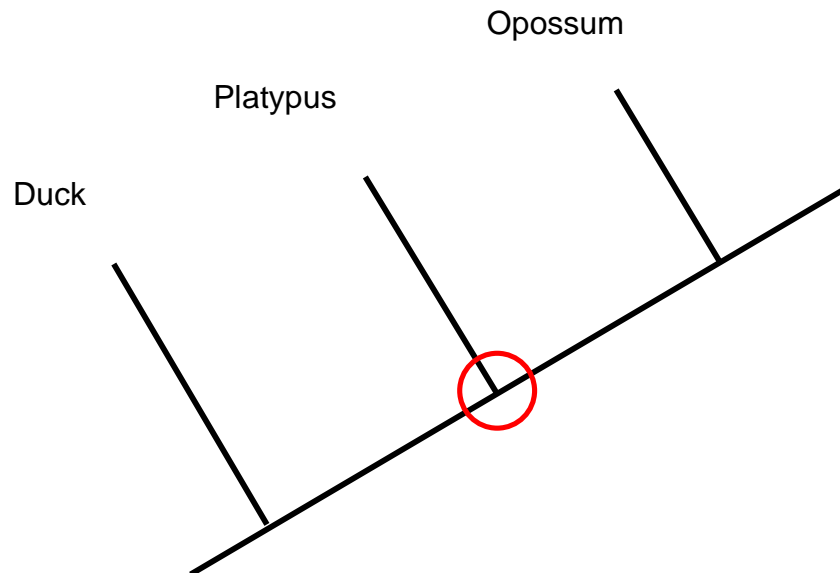
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Physical Classification: Platypus Relationships

A **phylogenetic** tree is a chart that depicts an evolutionary relationship among organisms.

- Linnaeus's method did not account for **evolution**.
- Modern taxonomy uses **evolutionary** relationships and **genetic** evidence to classify organisms.

Circle the part of the chart that indicates that the platypus falls in between the duck and the opossum.



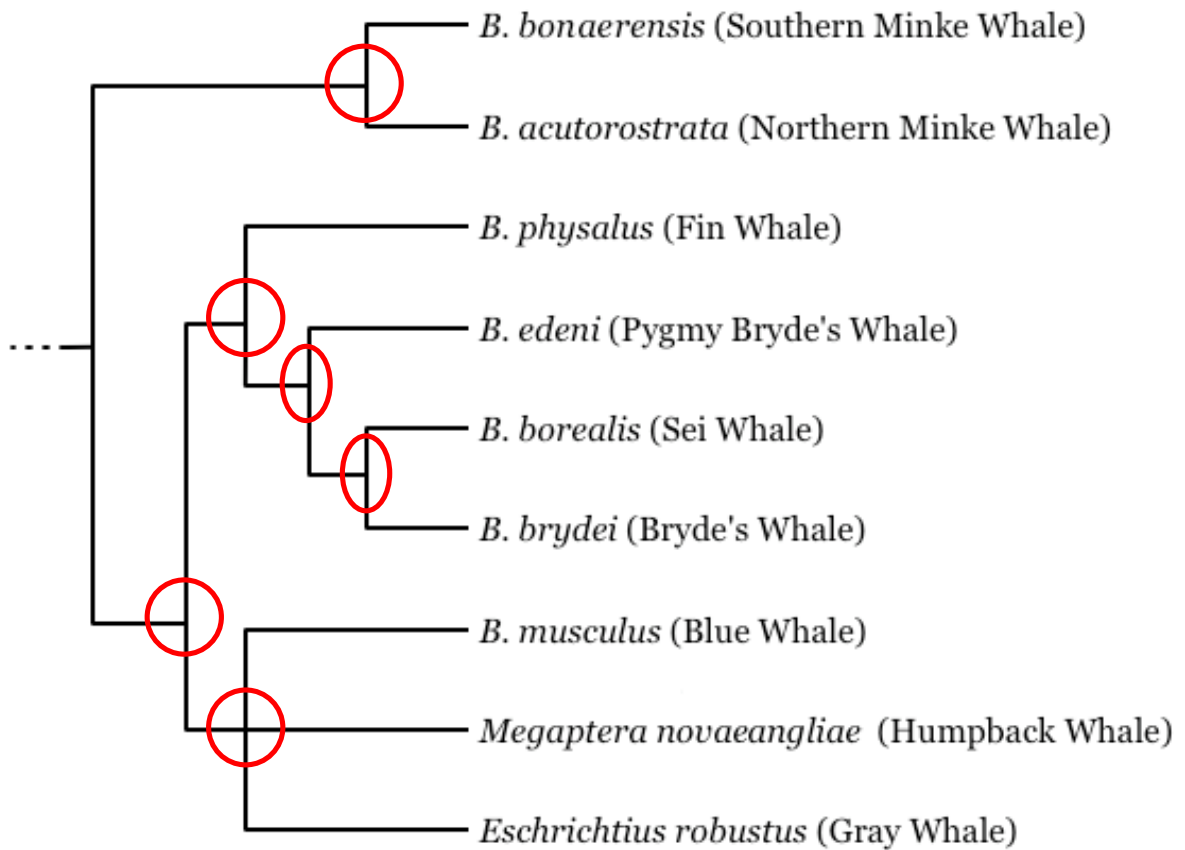
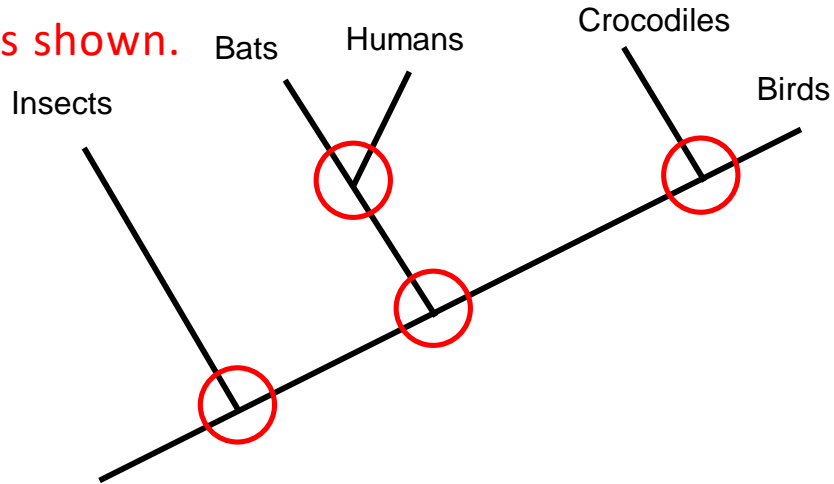
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Modern Taxonomy

Circle an area that indicates a common ancestor on each phylogenetic tree.

Grading Note: Students may circle any of the junctions shown.



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Methods of Classification

Let us return to the phylogenetic tree we think Linnaeus would have come up with.

- The **platypus** has a bill like a **duck** and lays eggs like a duck, so it must be related to a duck.
- But, the platypus is also a **mammal** like the opossum. It has hair and feeds its young milk.

To whom is the platypus most closely related? The secret can be found out in the names of these organisms.

Relatedness Among Organisms

Circle the first row in which the platypus, duck, and opossum diverge in their classification.

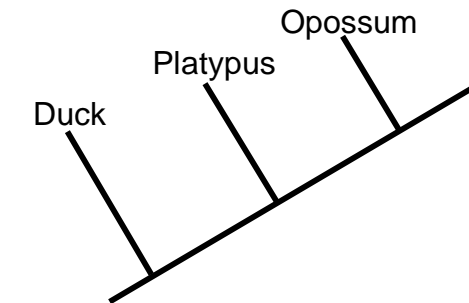
	PLATYPUS	DUCK	OPOSSUM
Domain	Eukarya	Eukarya	Eukarya
Kingdom	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata
Class	Mammalia	Aves	Mammalia
Order	Monotremata	Anseriformes	Marsupialia
Family	Ornithorhynchidae	Anatidae	Didelphidae
Genus	<i>Ornithorhynchus</i>	<i>Anas</i>	<i>Didelphis</i>
Species	<i>anitinus</i>	<i>platyrhynchos</i>	<i>virginiana</i>

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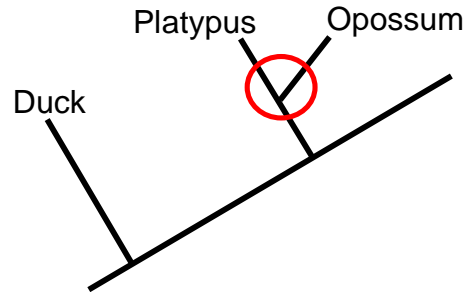
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Relatedness Among Organisms

Circle the junction that indicates that the platypus and opossum are more closely related than the platypus and the duck.



Based on **physical** characteristics



Based on structure, **genetics**, and evolutionary history

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Xenotransplantation**REAL-WORLD CONNECTION**

Xenotransplantation is the transplantation of an organ, tissue, or cells between two different species.

- Need to know how closely these creatures are related.

Summary

Methods of Classification

**Lesson
Question**

How are organisms classified?

**Answer**

(Sample answer) Organisms are classified based on structure, genetics, and evolutionary history.

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Review: Naming Organisms

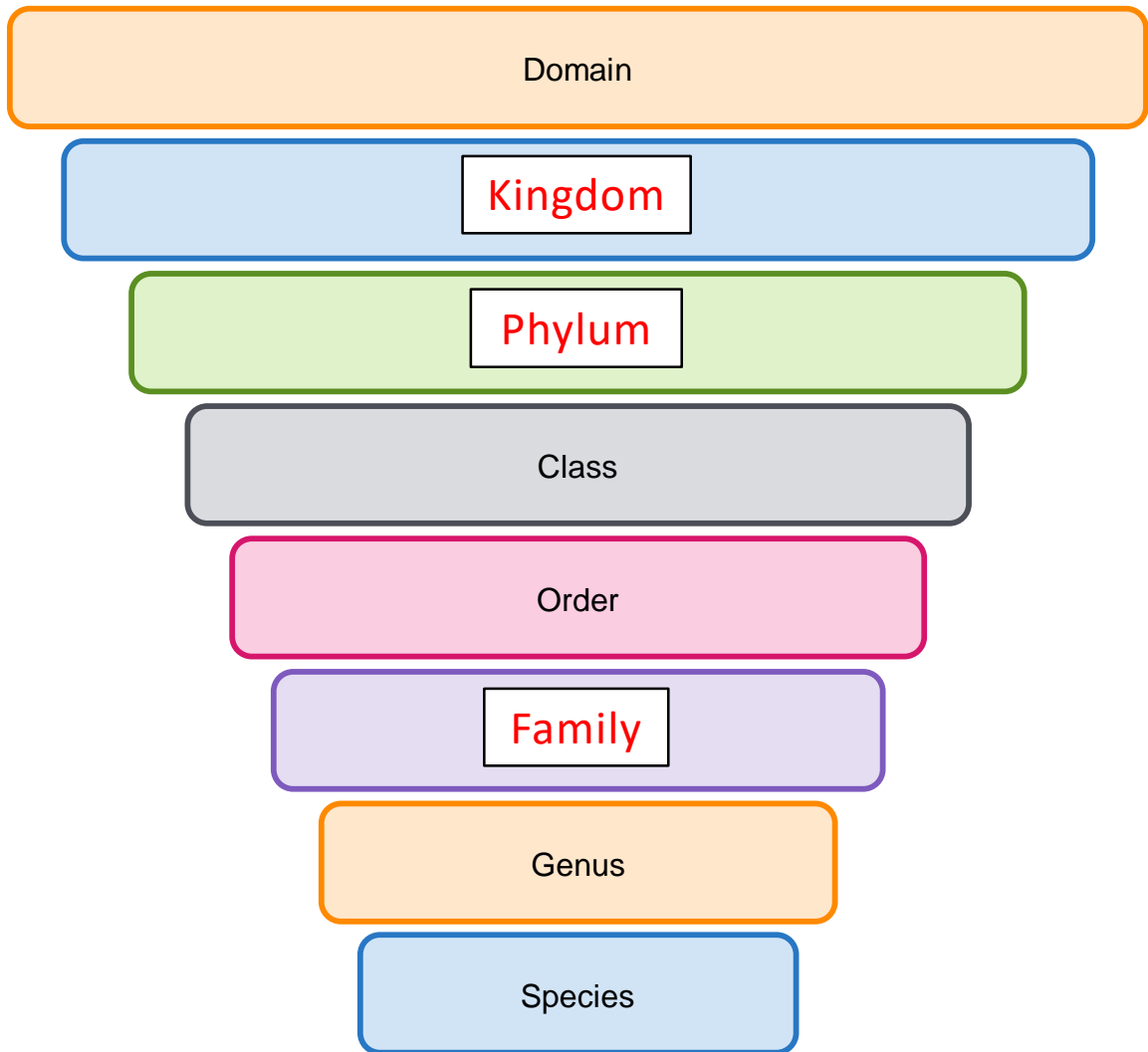
- **Common** names should **not** be used for scientific classification.
- Binomial **nomenclature**
 - **Carl** Linnaeus
 - Two-word **system**
 - Latin
 - Genus and **species**

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Review: Classifying Organisms

- **Binomial** nomenclature
- **Eight** levels of taxonomy
 - Dashing King Phillip Came Over For Great Spaghetti



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Review: Classifying Organisms

- **Phylogenetic** trees can be used to depict the evolutionary relationship among organisms.
 - Based on structure, genetics, and evolutionary **history**
 - Vary in size and **style**
 - Subject to **change**

Review: Changes to Classification Methods

- Fossil **record**
- **Discovery** of new species
- DNA **sequencing**



Summary

Methods of Classification

Use this space to write any questions or thoughts about this lesson.