



Taxonomy: Classification of slugs and snails

Standards addressed:

Next Generation Science

MS-LS4 Biological Evolution: Unity and Diversity

- MS-LS4-2: Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

Language Arts, Common Core Math

- Writing: Research to build and present knowledge

Learning objectives:

- Understand how taxonomy came into being and why.
- Understand the levels of the classification pyramid.
- Understand where slugs and snails are in the pyramid of classification.
- Learn the scientific and common name of common invasive gastropod species found in the school garden area. This will be important for data collection.

Reading for Understanding:

Taxonomy: *the science of how living things are grouped together, also called classification.*



Aristotle was a scientist from ancient Greece who lived from 384-322 BC. He was one of the first people to classify living things, and he divided them into two groups, or kingdoms; plants and animals. He divided the animals into subgroups, those that lived on land, in the water, or in the air, and he divided plants into small, medium, and large subgroups. But he ran into problems because some organisms didn't fit well, such as birds, bats, and insects, which could all fly, but otherwise were very different.



In the 1700's, another scientist named Carolus Linnaeus developed a better system of classification that was not so limited as Aristotle's. Linnaeus divided kingdom, plant or animal, into five levels; class, order, genus, species, and variety. Linnaeus established the two-part system of naming. The first part of the species name tells what genus the species belongs to, and the second part names the species within the genus. Linnaeus is known as the father of taxonomy and we use his system of naming things.

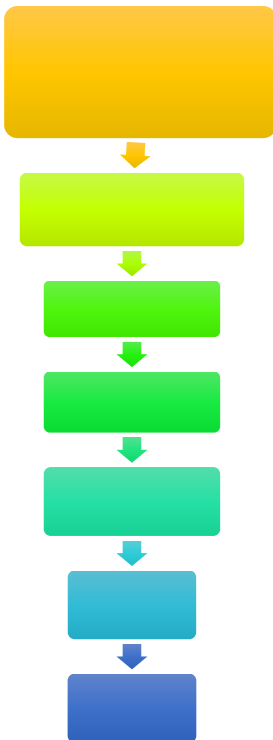
Why are names important?

The taxonomic method of naming uses a scientific method to create a common name for a species that is used globally. Because of the many languages spoken around the world, and the common names created, having one name that can be recognized globally is very important for scientists, and also helps those people who like to study living things. Many of the non-native slugs and snails you will meet in the garden will have a common name, such as the Cuban slug, the semi-slug, or the giant African snail, but they will also have a scientific name. This name has two parts; the first name tells the genus and the second name tells the species. For instance, the Cuban slug's scientific name is *Veronicella cubensis*. *Veronicella* is a genus of an air-breathing land slug in the family Veronicellidae,

and cubensis makes reference to the fact that this slug is *endemic*, or native, to Cuba. The scientific name for the semi-slug is *Parmarion martensi*. This slug belongs to the family Ariophantidae, and the genus *Pamarion*. All living organisms that have been identified are given a scientific name, and sometimes they carry the name of the person who first “discovered” them. Scientific names come from Greek and Latin languages and the words can seem unfamiliar and many are real tongue-twisters. Use phonetics to sound them out.

Pyramid of classification

Taxonomic classification starts with general characteristics and gets increasingly more detail specific.



While originally there were only two kingdoms, plant and animal, there are now six kingdoms recognized into which a living organism can be classified. The six kingdoms, starting from the simplest organisms to the most complex, are:

- **Archaeobacteria** (Extreme organisms that live in inhospitable places like hot springs and hydrothermal vents).
- **Eubacteria** (true bacteria)

- **Protista** (some have characteristics of animals while others resemble plants or fungi).
- **Fungi** (yeast and mushrooms).
- **Plantae** (plants)
- **Animalia** (animals)

This is a link to an educational site where you can learn more about the organisms that comprise the six kingdoms.

http://www.ric.edu/faculty/ptiskus/six_kingdoms/

Classification of Slugs and snails

Kingdom: Animalia

Animals are classified into two principal groups; **invertebrates** (without backbone) and **vertebrates** (with backbone). Invertebrates are the most abundant organisms on earth. Slugs and snails are invertebrates in the animal kingdom.

Phylum: Mollusca

Slugs and snails are in the **Mollusca phylum**. The Mollusca phylum is the second largest of all phyla (plural). Molluscs can be **terrestrial** (land-living) or **aquatic** (water-living). Aquatic molluscs can be either marine or fresh water dwellers. They have organs and a body wall which, in snails, is covered by a shell made from **calcium carbonate**, which is the same thing cement is made from.

What are examples of mollusks?

- Octopus
- Squid
- Clams
- Scallops
- Oysters
- Sea slugs, sea snails
- Aquatic (freshwater) snails
- Terrestrial (land) slugs and snails



As a comparison of the other organisms involved in our studies of rat lungworm disease, the rat lungworm itself is in the **Aschelminthes (Nematodae) phylum**, and the definitive host, the rat, is in the **Chordata phylum**.

Class: Gastropoda

The class **gastropoda** includes slugs and snails. The majority have a shell that the animal can withdraw its body into and are called snails. Gastropods that lack a shell are called slugs. The loss of the shell was an evolutionary change, which provided slugs with the advantage of being better at maneuvering and squeezing themselves to get through small crevices and into small spaces, such as under rocks and logs. Some **malacologists** (people who studies slugs and snails) refer to all gastropods, slugs included, as snails.

Family:

We have multiple **families** of non-native gastropods in Hawaii. The Cuban slug and the leatherback slug are in the **Veronicellidae family**, and the semi-slug is in the **Ariophantidae family**. Some gastropods are difficult to identify and we many only be able to identify them to the family level.

Genus and species:

You will notice the scientific names have two parts, the first part is the **genus** name and the two names together identify the organism to the **species** level. The names that may seem unfamiliar. That is because the names are taken from the Latin language, which was the language spoken many thousands of years ago when Rome ruled much of Europe. You might also notice that scientific names are *written with slanted letters known as italics*.

- *Cornu aspersum*, the European garden snail, is in Helicidae family.



- *Achatina fulica*, the giant African snail, is in Achatinidae family.



There are more than 40 different **non-native** and **invasive** slugs and snails that are now living in Hawaii. The list grows as new invaders smuggle their way into the state, often in plants being shipped to Hawaii. Some species can be found on all islands, such as *Achatina fulica* the giant African snail, and some have been limited to one or more islands but have not spread throughout the state, such as *Parmarion martensi* the semi-slug, which was only found on Oahu and Hawaii Island until very recently, when it was identified on the windward side of Maui. This slug is an effective host of the rat lungworm parasite, and so it is very important for Kauai residents to prevent this slug from arriving and establishing a population there. Information on some of Hawai'i's more common slug and snail pests can be found at this website.

https://www.ctahr.hawaii.edu/haraa/SLUGS_5_2014PressQ.pdf

Learning Activities

- Identify slug and snail species that have been found in the garden or at home. What is the common name? What is the scientific name?
- Using the internet for research, find information on the species commonly found in the garden or at home.
- Take a photograph of the slugs and snails commonly found in the garden or at home and, with the information found, make an identification card for that species which includes the common and scientific names.