

**Taxonomy** - is the science of grouping or organizing things into groups based on common characteristics.

### **Classifying Living or Non-living**

Science biologist study life, they need to be able to tell the difference between living things and non-living things. They ask themselves a set of questions:

Can it grow and develop?

Can it reproduce to make more of its own kind?

Can it make or get food?

Can it use food?

Can it sense and react to living and non-living things in its surroundings, and react to them?

Is it made up of cells?

If the all are yes then classify as living.

**Ecology** is the study of how living things interact with each other

## Factors of our Environment

**Biotic** are living factors include:

- Plants
  - Animals
  - Dead organisms & Waste Products  
(came from living at one time)
- } organisms

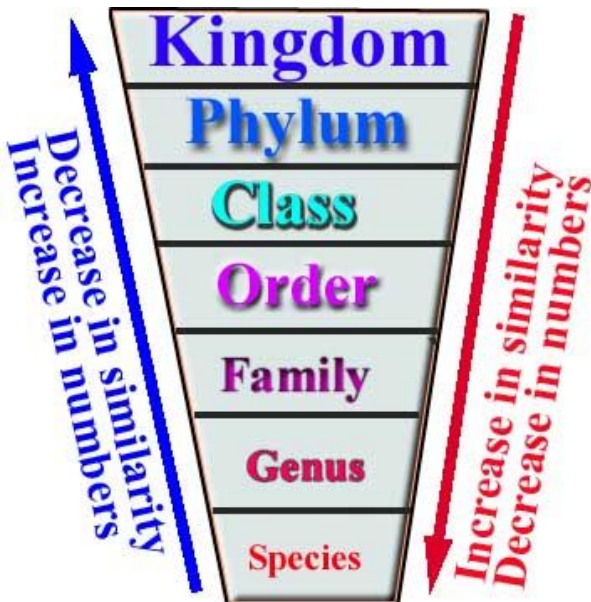
**Abiotic** are nonliving factors that affect other living things:

- Air
- Water
- Soil
- Rocks
- Light
- Temperature
- Climate

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## Biologist group living things

Hierarchy of classifying living things



King

Philip

Came

Over

For

Green

Skittles

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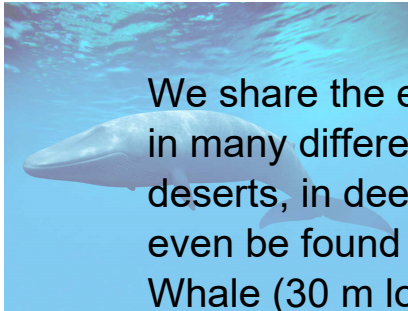
- 1) **Kingdom**-broadest and most inclusive level that includes a group of related phyla
- 2) **Phylum**-a group of related classes
- 3) **Class**-a group of related orders
- 4) **Order**-a group of related families
- 5) **Family**-a group of related genera
- 6) **Genus**-a group of related species
- 7) **Species**-smallest and least inclusive level that names one particular type of organism

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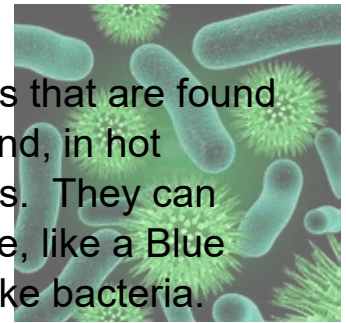
# Kingdoms

- Any grouping of organisms into kingdoms is based on several factors:
  - Presence of a nucleus
  - Unicellular or multi-cellular
  - How organisms get their food.
- Five different kingdoms of organisms are generally recognized by scientists today
  - **Protists**
  - **Monerans**
  - **Fungi**
  - **Plants**
  - **Animals**





We share the earth with many other living things that are found in many different places such as in water, on land, in hot deserts, in deep oceans and in the polar regions. They can even be found living inside you. Some are large, like a Blue Whale (30 m long) but some are microscopic, like bacteria.



- \* We classify things into groups in order to make things easier to understand.
- \* All living things share a set of characteristics in order to survive.
- \* All living things are grouped into the first level of classification known as a "kingdom".

There are 5 Kingdoms

- 1) Animals
- 2) Plants
- 3) Fungi
- 4) Monera (Bacteria)
- 5) Protists (Single-cell)

The Diversity of Living Things Continued

2) Phylum

Animals have been divide into 25 phyla (groups) . They may be grouped by similar in basic structure.

Ex) The elephant, fish and polar bear all belong to the Chordata Phylum because they all have a backbone.

3) Class

Class members have more common characteristics.

- Ex) Amphibians
- All live part of life in water and on land
  - Cold Blooded
  - Back Bone
  - Moist, smooth skin

Ex)

<u>Invertebrates</u>	<u>Vertebrates</u>
Arthropods	Mammals
Spiders	Birds
Insects	Amphibians
	Reptiles
	Fish

4) Order

Groups are more alike than those of class

- EX) <sup>Three primary orders of Amphibia within the Subclass Lissamphibia</sup>
- > Caudata (Urodela) - Salamanders
  - > Anura (Salientia) - Frogs and toads
  - > Apoda (Gymnophiona) - Caecilians

5) Family

Groups are more alike than those of order

- ex) Family Cryptobranchidae - hellbenders
- > "hidden gill"
  - > contain the largest living salamanders
  - > distributed in eastern US, Japan, one species in China to 9
  - > *Cryptobranchis alleganiensis* found in Appalachians of Kentucky/Tennessee
- Family Ambystomatidae - mole salamanders
- > restricted to US and Canada
  - > represented by marbled, tiger, and small-mouthed salamanders

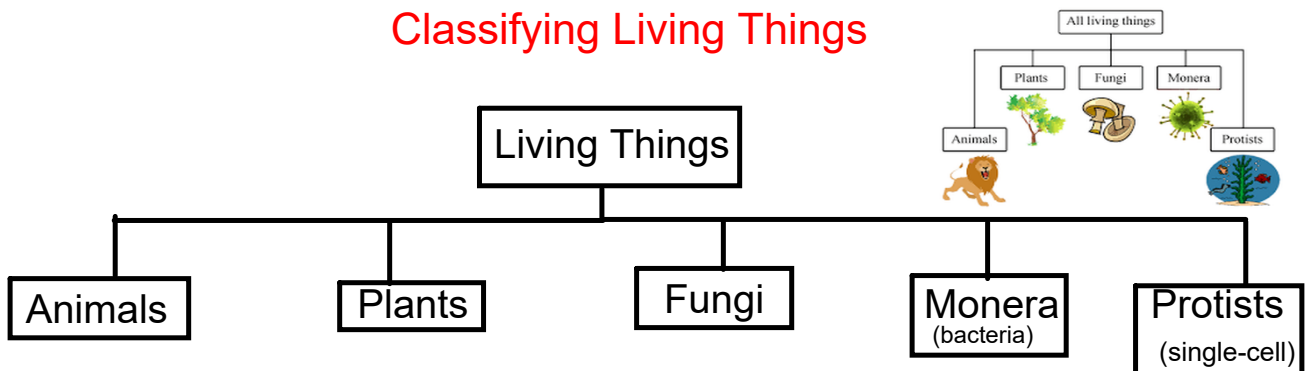
6) Genus

These are made up of groups that are very similar, but the groups cannot breed together. Ex) Coyotes & Wolves

7) Species

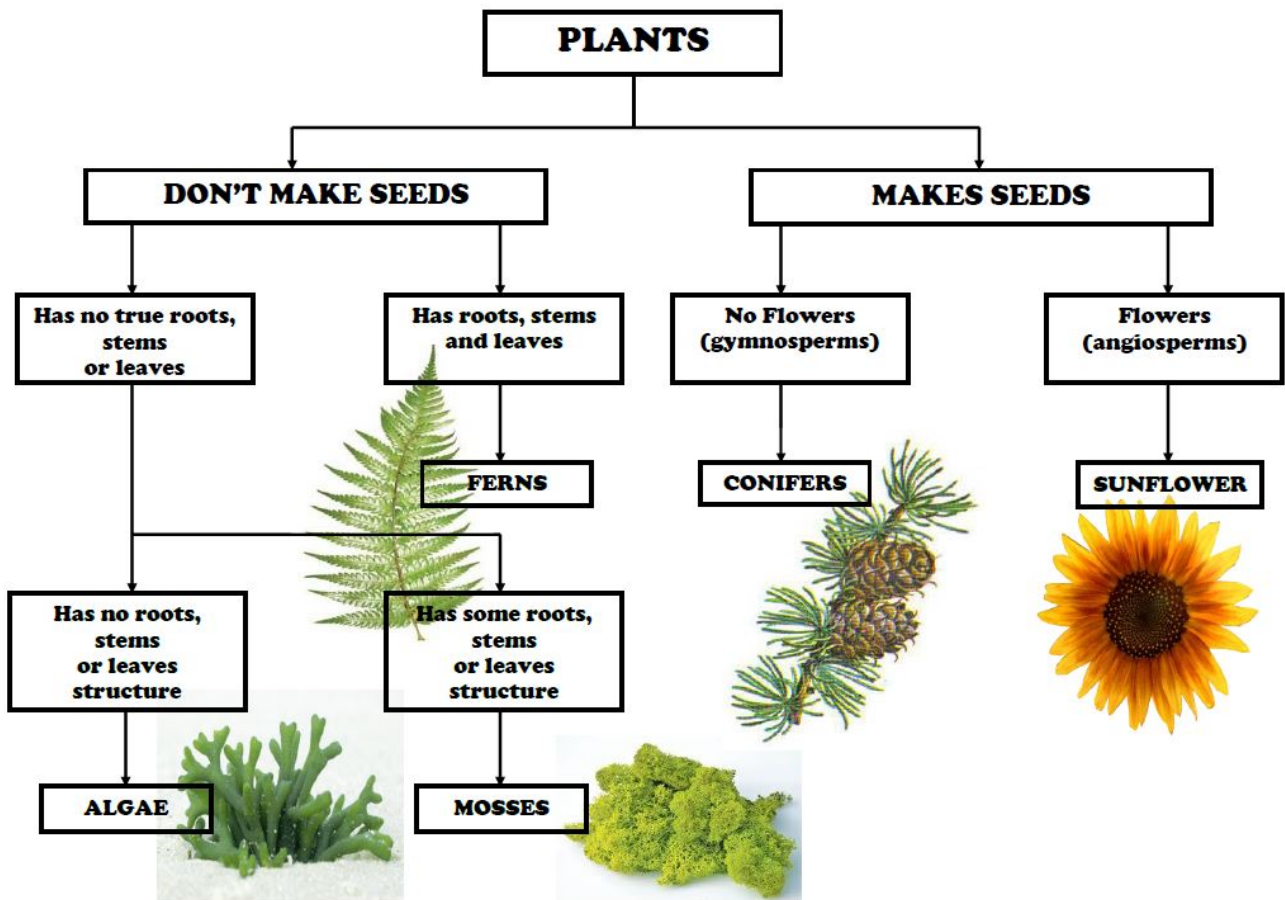
Is a population of animals that can breed with one another. The young grow up to look like their parents.

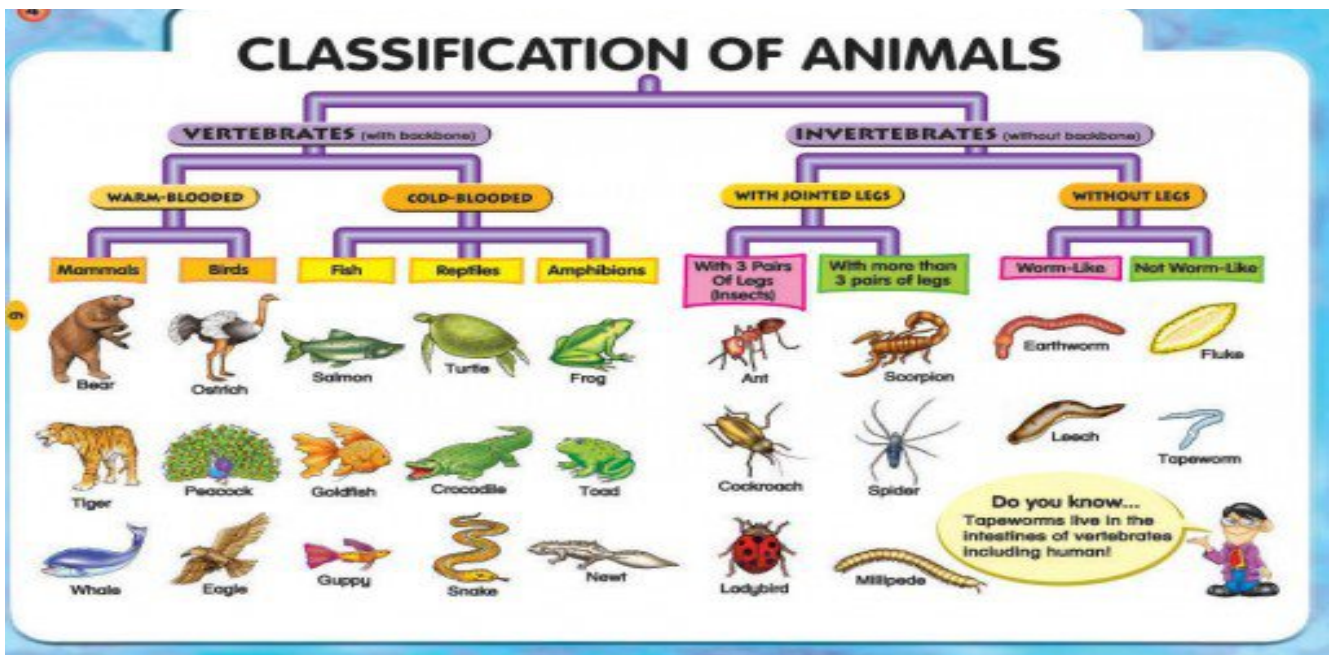
### Classifying Living Things



A breakdown of more of each category is to follow on the next few slides







## Terms

**Exoskeleton** is a hard supporting structure on the outside of the body.

Example) lobster's shell.

**Endoskeleton** is a hard supporting structure on the inside of the body.

Example) bones

**Primitive** - was around at the beginning of time

**Terrestrial** - Lives on land

**Aquatic** - Lives in water

**Species** - Are living things that can breed together to produce offspring that can also breed together.

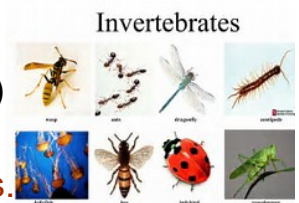
Ex) Cats can breed with other cats

(Cats cannot breed with a dog)

## Animal Classification

**Invertebrates** - any animal that does not have a back bone.

Categories of Invertebrates (we will focus on are the following)



**Sponges** - are the most primitive of the animal groups.

- They live in water.
- They do not move from place to place.
- They filter tiny organism out of the water.



**Coelenterates** - are similar to sponges. They in water.

- They may or may not move from place to place.
- They have stinging tentacles.
- Soft Bodies
- Reproduce by budding (growing small body part that falls off and grows into a new organism).

Ex) Jelly fish, anomes (where nemo lives)

## Invertebrates Continued



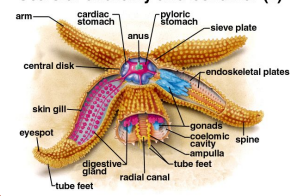
**Echinoderms** - live in sea water

- Have internal skeletons

- Have suction pads to hold them in place

Ex) Star Fish, Sea Urchins, Sea Cucumbers

Sea star anatomy and behavior (1)



**Worms** - live in many different habitats



- Have soft long bodies

- May have appendages (legs) like a caterpillar



Ex) Flat Worm, Earth Worm, Round Worm

**Arthropods** - Have jointed legs or foot



- Have a hard outer shell (exoskeleton)

-most land species are insects

-molt their skin/shell as they grow

-includes crustaceans (Shellfish)

ex) Ants, spiders, lobsters, crabs

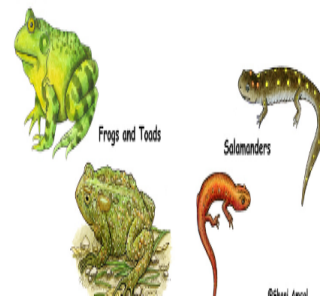
## Animal Classification (Part 2)

**Vertebrates**- is any animal that has a backbone

Categories of Vertebrates (we will focus on are the following):

**Amphibians** - are aquatic in early life cycle, but terrestrial as adults

- bony skeleton
- four limbs with webbed feet
- smooth, moist skin
- cold-blooded (ectothermic)
- Fertilization external in some (Frogs, toads) and internal in others (salamanders)
- Young receive no parental care



**Fish** - all are aquatic

- bony skeleton
- paired fins
- skin covered with scales in most species
- cold-blooded (ectothermic)
- Fertilization external in all
- Young receive no parental care



## Animal Classification (Part 2)

### Vertebrates continued

**Reptiles** - terrestrial, but many species spend time in the water

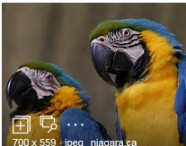


- bony skeletons
- paired limbs (except snakes & Lizards) with clawed toes
- scale-covered skin



- cold-blooded (eco-thermal)
- Fertilization internal
- Young receive some parental care (alligators) in some species

**Birds** - Terrestrial



- hollow boned skeleton
- paired limbs with the forelimbs as wings (some are not useful flight)
- Species adapted to flight
- warm blooded (endo-thermal)
- fertilization internal

# Habitat

- The place where an organism lives.
- Specific characteristics that the organism needs to survive.
- Typically, a species cannot survive for very long if their habitat changes too drastically.



## Warm Blooded

**Warm-blooded** creatures, like mammals and birds, try to keep the inside of their bodies at a constant temperature.

They do this by generating their own heat when they are in a cooler environment, and by cooling themselves when they are in a hotter environment. To generate heat, warm-blooded animals convert the food that they eat into energy. They have to eat a lot of food, compared with cold-blooded animals, to maintain a constant body temperature. Only a small amount of the food that a warm-blooded animal eats is converted into body mass. The rest is used to fuel a constant body temperature.

Keep warm by having hair, fur, blubber, or feathers. They can also shiver to generate more heat when they get too cold and some migrate from colder to warmer regions in the winter.

To cool they sweat (Humans) or pant (dogs) or move into the shade or water.

**Blubber** is a special layer of fatty tissue that **animals** living in cold environments developed over time as a way of keeping warm.



Human Body Temperature is 37°C

## Cold Blooded

Cold-blooded creatures, like reptiles often like to stay in the sun to warm up and increase their metabolism

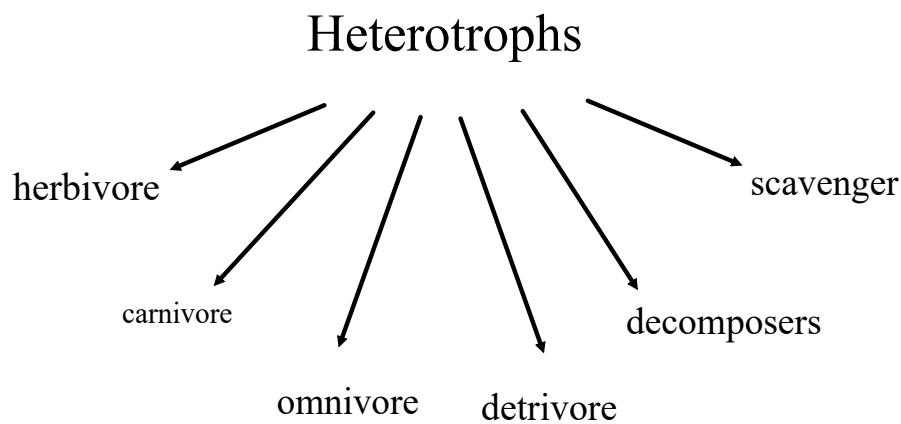
They will expand their lungs to make them look larger so the sun will shine on more of their body to increase their temperature. Some can change color to either absorb or reflect light.

## Autototrophs vs. Heterotrophs

Autotrophs (producers) capture energy from sunlight or chemicals to produce their own food.

ie / plants

Organisms that rely on other organisms for their energy and food supply are called heterotrophs (consumers). These include animals, fungi and bacteria.



**Herbivores**, such as cows, obtain energy by eating only plants.

**Carnivores**, such as snakes and owls, eat only animals.

**Omnivores**, such as humans and bears, eat both plants and animals.

**Detritivores**, such as earthworms, feed on dead matter.

**Decomposers**, such as fungi, break down organic matter.

**Scavengers**, such as vultures, consume the carcasses of other animals.

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**Food chain** is a step-by-step sequence linking organisms that feed on each other

Producers get their nutrients from the soil, water and air.

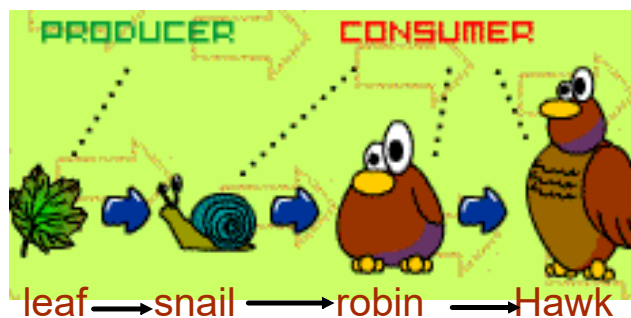
Consumers feed on living or once living organisms as a source of energy and nutrients

Herbivores get nutrients when they eat producers.

Carnivores get nutrients when they eat herbivores.

Decomposers break down animal wastes and dead organisms.

The actions of decomposers release nutrients back into the soil, water and air so producers can use them again.



Arrow direction points to what eats the animal

## Food chain effects

Sun → Grass → Grass-hopper → Frog → Hawk

What would happen if the frog population disappeared?

- a) Grasshopper population would increase
- b) Grass would become over-grown
- c) The fish population would decrease
- d) Haw Populations would increase

Since less animals are eating the grasshopper then it will have little threat and will be able to reproduce. Another effect of removing the frog is that the Hawk would not have food and will decrease its population.

The\_Vanishing\_Frog\_with\_Jeff\_Corwin.wmv

1.1

<https://www.youtube.com/watch?v=X0J40D2d0-I>

<https://www.youtube.com/watch?v=Xuobs4RO10k>

<https://www.youtube.com/watch?v=pN8R0GkOaVo>

## What would happen if frogs started to disappear?

- Declining frog populations would cause mosquito and fly populations to increase
- Declining tadpole populations would cause algae populations to increase this would cause serious environmental hardship

<https://www.youtube.com/watch?v=b3V04D3C4Lg>

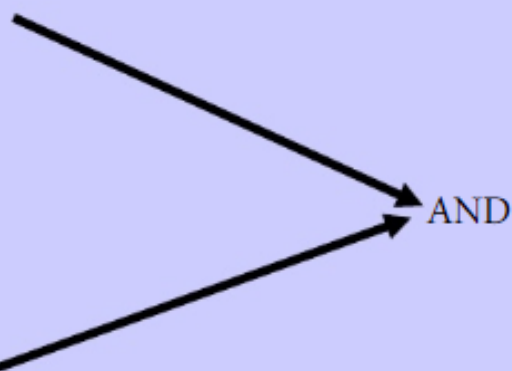
# Why are Frogs disappearing?

1.1

- loss of habitat
  - human development has caused areas needed for frog populations to diminish
  
- air and water quality
  - Harmful bacteria forming
  - air pollution gets absorbed into the skin of a frog
  - reproduction rates decrease with increasing levels of acid rain
  
- increased exposure to ultraviolet radiation
  - high levels of UV radiation burns skin and damages skin cells
  
- climate change
  - higher temperatures are hard for frogs to adapt to

We can separate adaptations has into two categories:

A  
D  
A  
P  
T  
A  
T  
I  
O  
N  
S



1) Physical



2) Behavioral





Hey! I'm a walking stick. I look just like a stick you'd find on the ground.

### 1) Physical adaptations

are body structures that allow an animal to find and consume food, defend itself, and to reproduce its species.

Helps the animal survive in its environment



## Some Physical adaptation

i) Camouflage (use of color in a surrounding)



The chameleon can change its color to match its surroundings.  
Can you do that?

### Physical adaptation

#### ii) Mimicry

(looking or sounding like another living organism)

The Viceroy butterfly uses mimicry to look like the Monarch butterfly. Can you tell them apart?



Poisonous

I'm the Monarch!

I'm the Viceroy!

Not poisonous



Physical adaptation



iii) *Chemical defenses* (like venom, ink, sprays)

### Physical adaptations

iV) Body coverings & parts (claws, beaks, feet, armor plates, skulls, teeth)



The elephant's **trunk** is a physical adaptation that helps it to clean itself, eat, drink, and to pick things up.

Now let's learn about  
**Behavioral Adaptations...**



2) **Behavioral Adaptations** allow animals to respond to life needs.

We can divide **Behavioral Adaptations** into two groups:

i) Instinctive

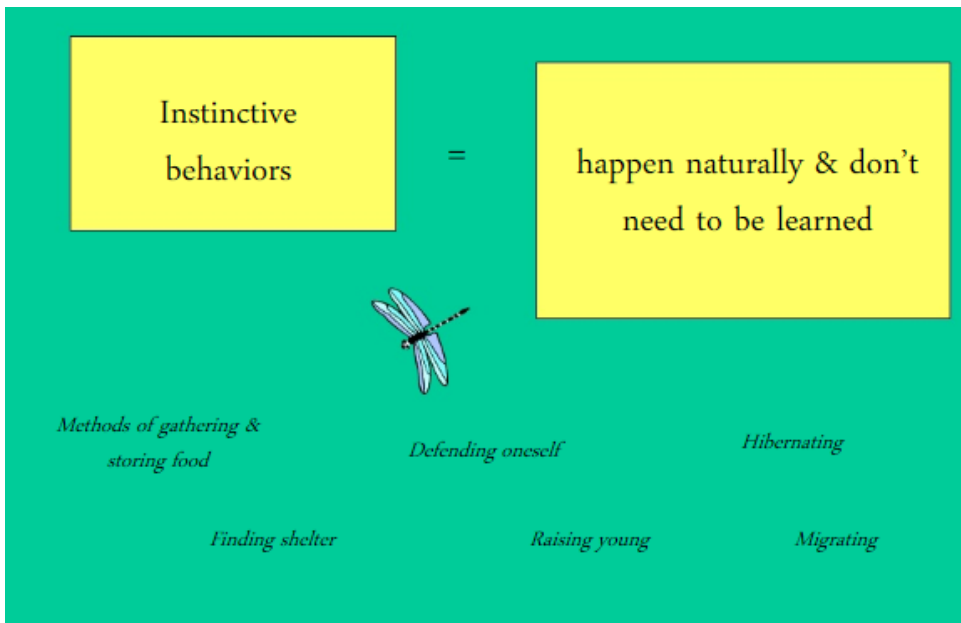


These behaviors happen naturally & don't have to be learned.

ii) Learned



These behaviors must be taught.





Learned  
behaviors


=

Obtained by interacting with  
the environment and cannot  
be passed on to the next  
generation except by teaching.





Physical adaptations are body structures.

Some examples of physical adaptations are:

 Camouflage

 Mimicry

 Chemical defenses

 Body coverings & parts

Behavioral Adaptations are animals' actions.

Behavioral Adaptations can be  
Instinctive or Learned.



**In Canada, there are more than 250 species of plants and animals at risk of extinction**

**Extinct** - a species that no longer exists anywhere.

**Extirpated** - a species no longer existing in the wild in one area but occurring elsewhere in the world.

**Endangered** - a species that is close to extinction throughout all or a large portion of a specific area.

**Threatened** - a species likely to become endangered if the factors affecting it are not reversed.

**Vulnerable** - a species particularly at risk because of low or declining numbers, or some other reason, but not a threatened species.

**adaptation** - any genetically controlled characteristic (structural, physiological or behavioural) that enhances the chance for members of a population to survive and reproduce in their environment

**structural adaptations** - coloration, mimicry, protective cover, gripping mechanisms

**physiological adaptations** - ability to poison prey, give off chemical to repel predators, hibernate during cold weather

**behavioural adaptations** - migration, resource partitioning, species interactions (ie/parasitism)



## Fossils

- Fossils are preserved remains of living things
- Most are formed when living things die and are buried quickly by sediment before it's eaten, decomposed or weathered.
- The sediment will slowly harden into rock and keep the shape of the organism.
- Paleontologist are scientist that study fossils

Detailed fossil of a mioplosus  
swallowing a small fish.



- Fossils provide evidence of how life has changed over time.
- Fossils help scientists infer how Earth's surface has changed.
- Fossils are clues to what past environments were like.

## The Fossil Record and life

- The fossil record provides evidence about the history of life on Earth. The fossil record also shows that different groups of organisms have changed over time.
- Evolution is the gradual change in living things over long periods of time.
- Extinct is if an organism no longer exists and will never again live on Earth.