Module 2
And I manage to survive!

7th and 10th grade

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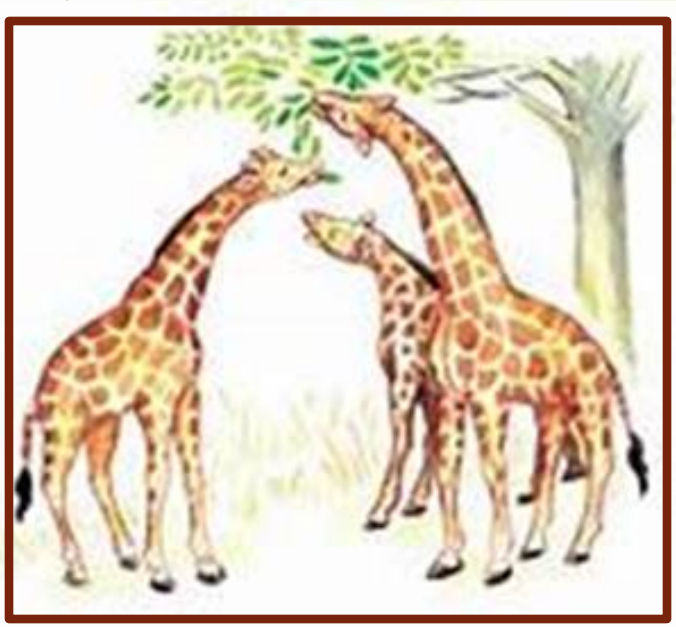
LEARNING OBJECTIVES

Through the activity, the participant will:

- Given a group of organisms, classify them by the kinds of adaptations.
- Distinguish between the concepts adaptation, structural adaptation, behavioral adaptation and physiological adaptation.

What happened to the dead giraffe?



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What does adaptation mean?

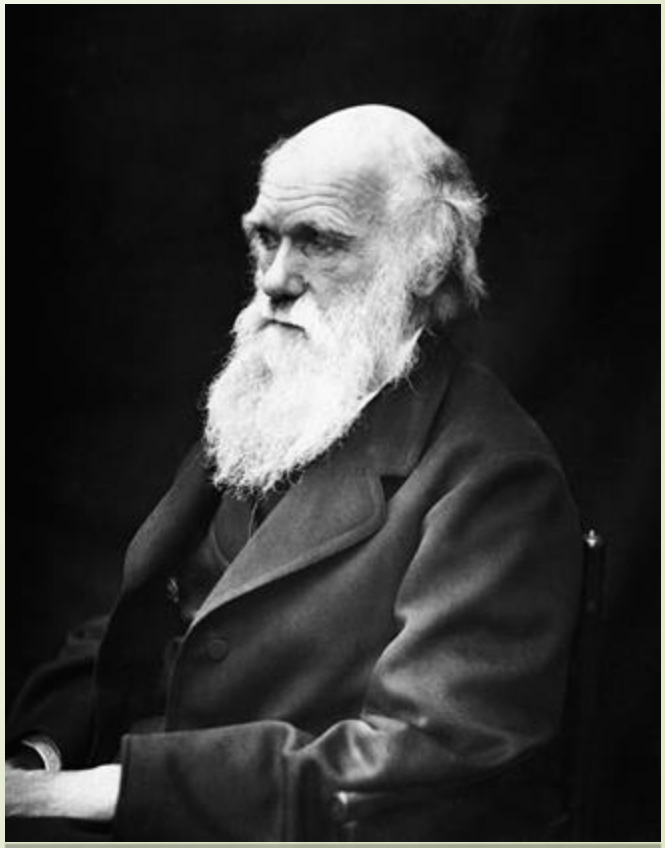
- Any trait that increases the chance of survival of a population.
- Any trait that lets the organism survive and reproduce better in a determined environment.

¿What do you understand by natural selection?

- It is the **process** through which inherited traits help an organism to survive.
- Natural selection tends to preserve the beneficial adaptations in populations and eliminate the harmful ones.
- Survival of the fittest.

Charles Darwin

- Graduated University at age 21.
- Did not know what to do with his life.
- His father wanted him to be a doctor.
- He obtained a title in theology.
- His main interest was plants and animals.



Natural Selection

Overproduction

1. Overproduction: A tarantula's egg sac can contain between 500 and 1,000 eggs. Some eggs survive and get to be adult spiders. Others, don't.

Inherited variation

2. Inherited variation: Each individual has a combination of unique traits. Tarantulas look like their parents, but they are not identical.

Fight for survival

3. Fight for survival: Some tarantulas are captured by predators, like this wasp, Other tarantulas die of starvation or illness. Only some tarantulas survive until they reach adulthood.

Satisfactory reproduction

4. Satisfactory reproduction: Tarantulas that are better adapted to their environment have better chances of having surviving offspring.

What mechanisms does an organism need to survive?

Do you think animals use color to protect themselves or survive in different environments?

What kind of adaptation would that be?
Do you know what's it called?

What is camouflage?

- It's advantageous both to avoid predators and do hunt prey.

What is mimicry?

- Similarities between different animal species.
- It is an ability that some living creatures possess to look like other living creatures in their surroundings (to which they are not related) and its own surroundings to obtain a functional advantage.

The objective of mimicry

- To trick the senses of other animals that live together in the same habitat, inducing in them a determined behavior.

Kinds of mimicry

Müllerian Mimicry

Batesian Mimicry

Self-mimicry

Müllerian mimicry

- Two **inedible** species mimic mutually and possess a colorful coloration used as warning to others.
- Reduces the impact that would exist only on one species.

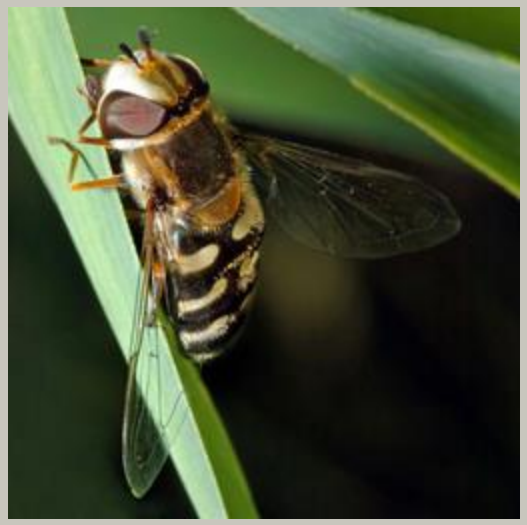
Monarch

Viceroy

Both have a bitter taste

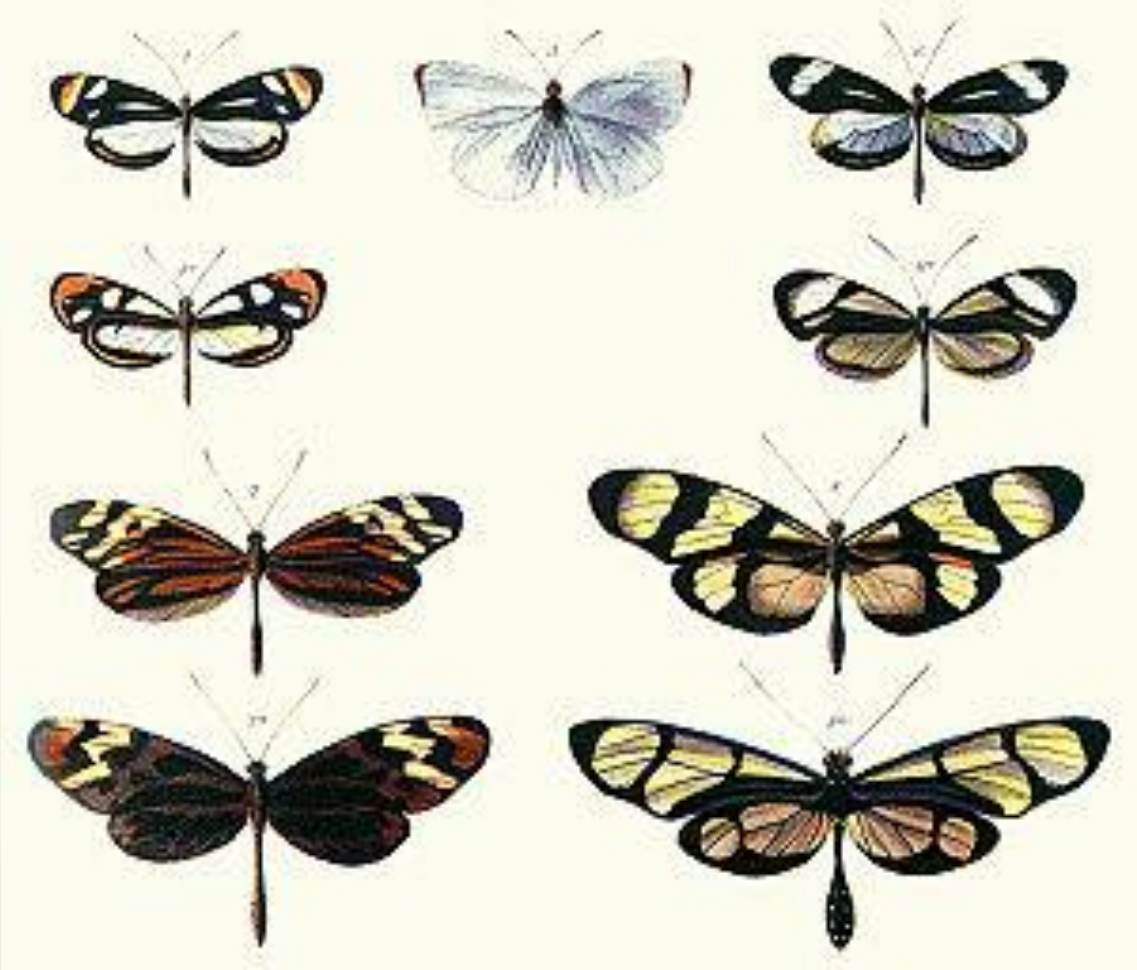
Batesian Mimicry

- Two or more species that are similar in appearance, but only one of them is armed with spines, stings, or chemicals.



Syrphidae and bombilidae imitating bees and wasps

Batesian Mimicry



Self-mimicry

- A part of the body mimics another part to increase its chances of survival.
- Examples
  - Moths
  - Butterflies
  - Fresh water fish

Owl butterfly

Two-headed snake from Central Africa

Locomotion

Why do organisms travel?

- To relate with each other
- To feed
- To search for home or shelter
- To flee from dangerous situations

Animal locomotion

- It is the study of how animals move.
- Movement performed by an animal to move from a place to another, to travel in space.
- It varies in terms of shape, structure, speed and other elements according to the type of subject we refer to.

Locomotion systems

- **Swimming by propulsion** advancing or retreating movement caused by the reaction to rapid expulsion of jets of water.

- **Swimming by body undulations** present in animals with an internal skeleton.

Creeping movements

- Mollusks and soft-bodied animals that lack an internal skeleton possess this movement.

Fins

- Fins are important organs for swimming.
- With soft movements, fins oppose the current's actions as well as gravity, permitting fish to maintain in a complete resting state.
- Fish's scales help them travel in water.

Locomotion on surface

- Cursory locomotion:

  Cursorial animals are those who travel long distances quickly.

- Saltatory locomotion:

  Some vertebrates whose means of locomotion is jumping are kangaroos.

Locomotion on surface

- Fossorial locomotion:
  - Animals that dig have it. Animals like saurians and moles.

- Tree locomotion:
  - Animals that travel on trees have it, like some monkeys.

Aerial means

- Some animals travel part of their lives by aerial means.
- In order to travel, they have a pair of limbs transformed into wings.

Body cover

Animal's covers

- Serves as protection against environmental factors
  - Rain
  - Cold
  - Heat
  - Predators

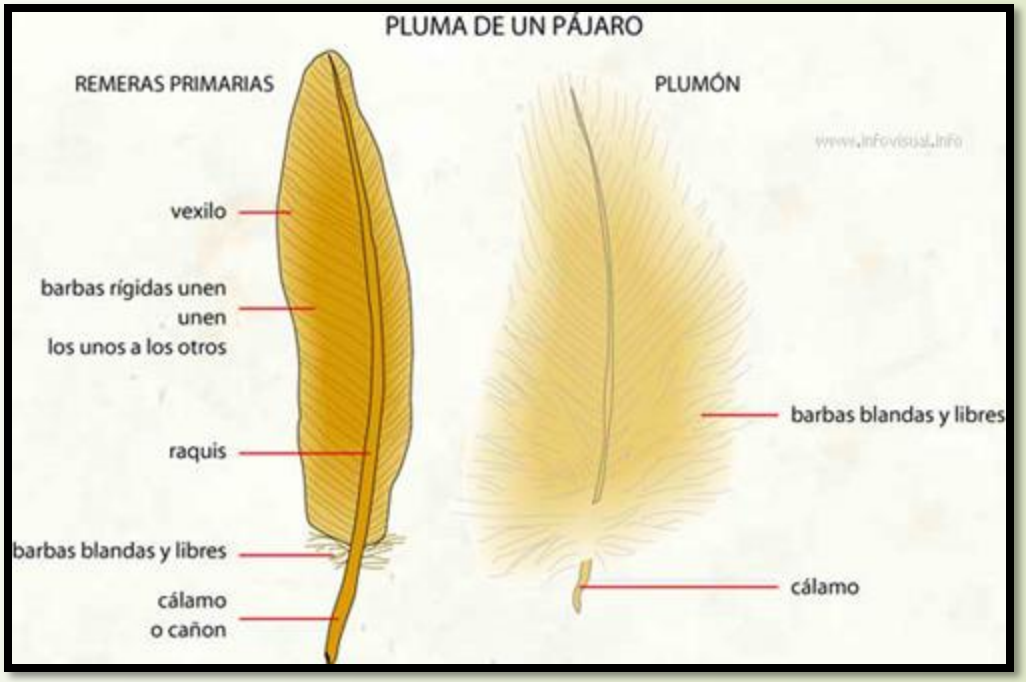
Hairs and spines

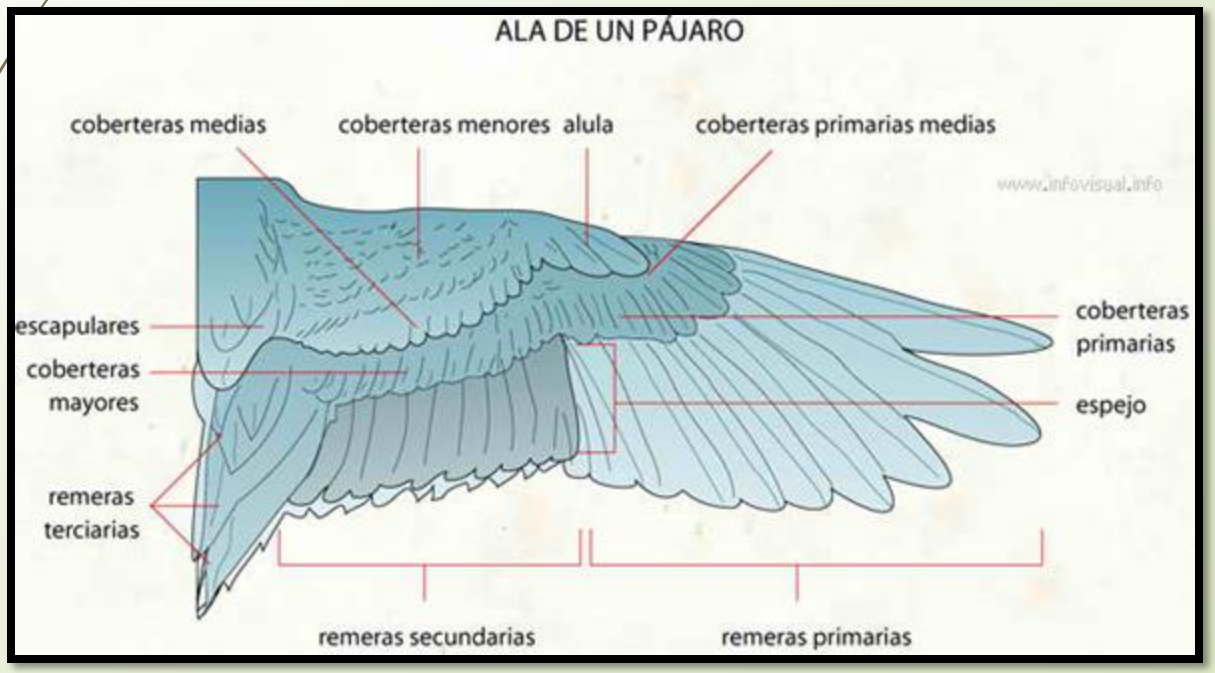
- Protection against predators
- Protection when facing physical aggressions
  - burns
- Thermal insulator
  - Prevents body heat loss.

Feathers

- Dense, insulating layer, that protects an animal against water and cold. Feathers prevent that animals lose body heat in damp places.

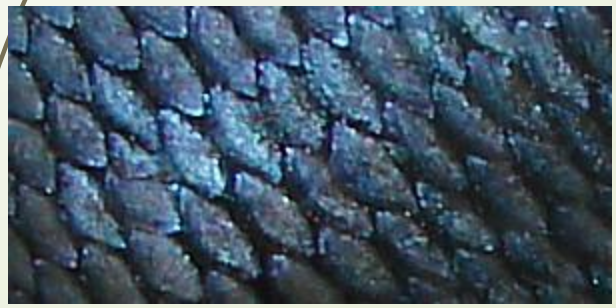
Feathers


PLUMA DE UN PÁJARO
REMERAS PRIMARIAS
PLUMÓN
vexilo
barbas rígidas unen
unen
los unos a los otros
raquis
barbas blandas y libres
cálamo
o cañon
barbas blandas y libres
cálamo


ALA DE UN PÁJARO
coberteras medias
coberteras menores
alula
coberteras primarias medias
escapulares
coberteras
mayores
remeras
terciarias
coberteras
primarias
espejo
remeras secundarias
remeras primarias

Scales

- Each flat sheet comes from dermal or epidermal origin and cover the skin of some animals, like fish and reptiles.
- They give physical protection, insulation, and, in fish, less hydrodynamic resistance (travel).



Do all birds eat only one kind of food? Why?

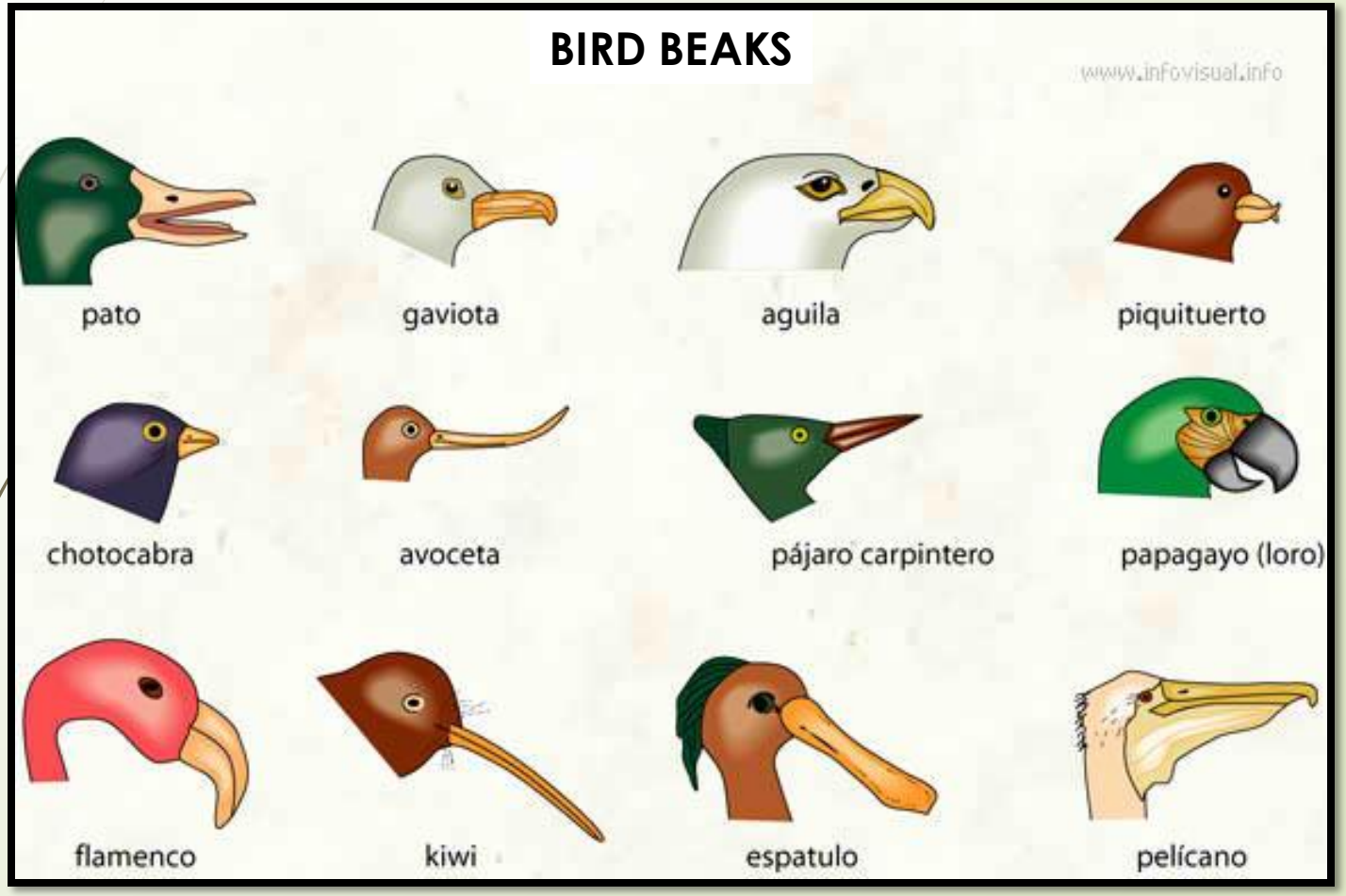
Specialized birds

- They concentrate in a reduced dietary spectrum or have a unique food searching strategy.

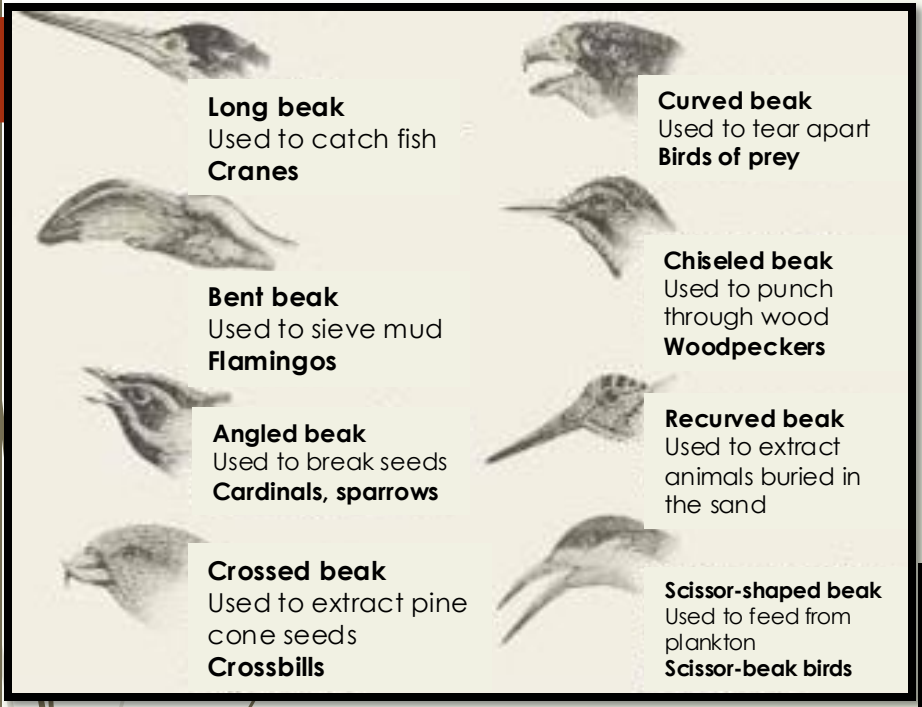
Generalist birds

- They employ many different strategies to search for a wide variety of food.

Bird beaks


BIRD BEAKS
www.infovisual.info
pato
gaviota
aguila
piquituerto
chotocabra
avoceta
pájaro carpintero
papagayo (loro)
flamenco
kiwi
espatulo
pelícano

Kinds of beaks and legs



Long beak
Used to catch fish
Cranes

Curved beak
Used to tear apart
Birds of prey

Bent beak
Used to sieve mud
Flamingos

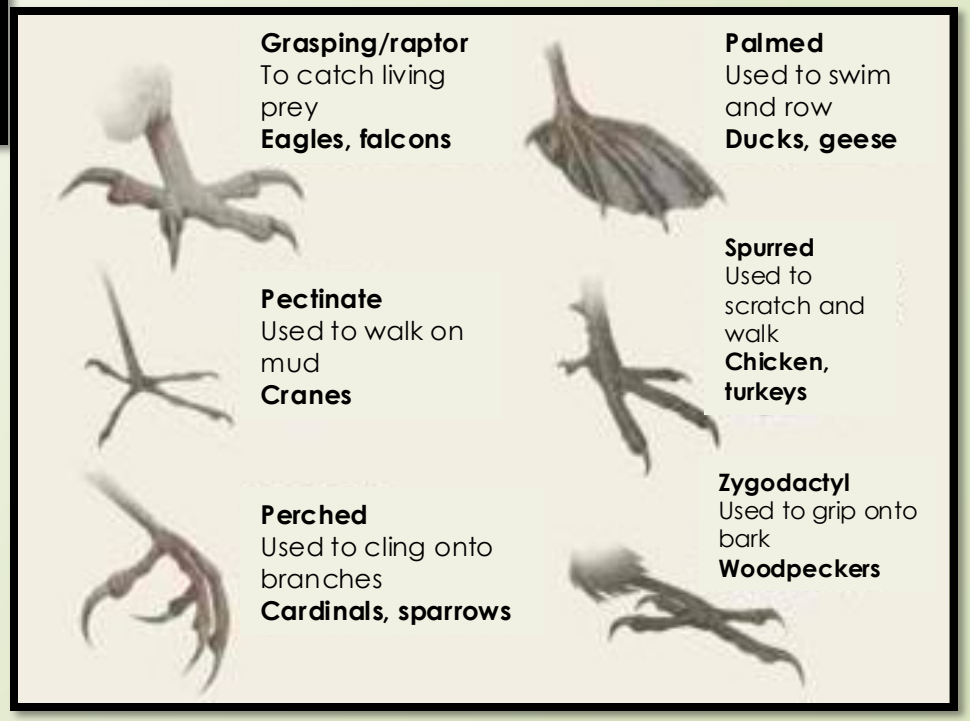
Chiseled beak
Used to punch through wood
Woodpeckers

Angled beak
Used to break seeds
Cardinals, sparrows

Recurved beak
Used to extract animals buried in the sand

Crossed beak
Used to extract pine cone seeds
Crossbills

Scissor-shaped beak
Used to feed from plankton
Scissor-beak birds



Grasping/raptor
To catch living prey
Eagles, falcons

Palmed
Used to swim and row
Ducks, geese

Pectinate
Used to walk on mud
Cranes

Spurred
Used to scratch and walk
Chicken, turkeys

Perched
Used to cling onto branches
Cardinals, sparrows

Zygodactyl
Used to grip onto bark
Woodpeckers

What do these adaptations have in common?

Structural adaptations

- Morphological adaptations
- It refers to organisms' body structures that benefit them and significantly contribute to their chances of survival.

Physiological adaptations

- It refers to the functioning of an individual that qualifies it to survive in a given environment.
- Hibernation
  - Lowers temperature, heart rate and breathing
  - Enables energy conservation during winter

Behavioral adaptations

- Behaviors that help determine if an organism can survive in an environment.
- Behavior – set of responses of an organism to changes that happen in its surroundings.

Behavioral adaptations

- Bird courtship
- Migration
- Living in groups

Structural / morphological

Behavioral

Physiological

Adaptations

Adaptations of some animals to climate

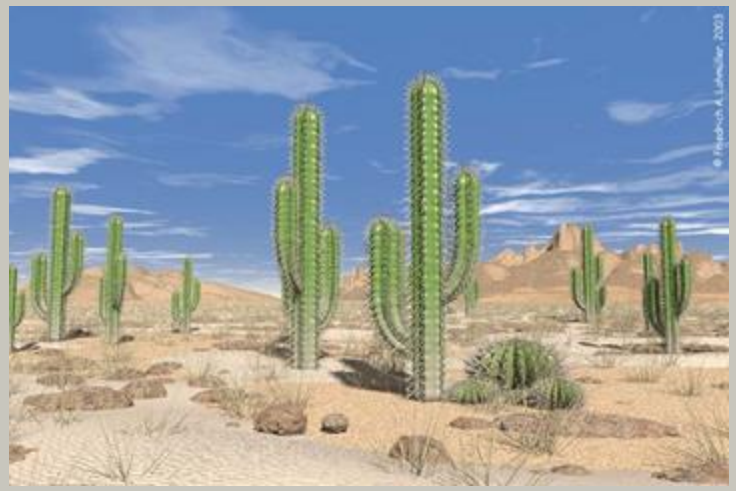
Desert

- Eyebrows
  - Protect from light
- Knees
  - They have skin cushions to prevent they burn with the hot sand
- Long toes in each leg
  - Connected by a cushion that lets them walk on sand without sinking

Antarctic

- Feathers form a rigid exterior and a soft, warm coat in their bodies.
- They have a layer of fat underneath their skin.
- They have a long beak to catch their prey.

Some adaptations on plants



Leaves

Salt tolerance

Chemical defenses

Nutrition specialists

Roots

Desert plants

- Superficial root systems let cacti absorb water from the surface.
- Thorns are reduced leaves that prevent water loss.
- Most of the photosynthesis takes place on their bulky stems.
- Roots possess long hairs that absorb water.

Structural adaptations of seeds

- Structures similar to the ones produces by the seed's cover.
- The aril, a bulky and nutritious part (pulp) covers some seeds and it serves to attract vertebrates
- Starch-rich structures called elaiosomes serve to attract ants.
- Seeds with a thick, round layer are frequently scattered by rodents.

Observe the images and complete the information requested on Worksheet #3




Memory Game





Memory Game

Use the images of organisms shown in the *power point* presentation to complete the information in the following table

Organism	Trait	Adaptation (structural, behavioral, or physiological)	Benefit of the adaptation

Memory Game

Organism	Trait	Adaptation (structural, behavioral or physiological)	Benefit of the adaptation
Viceroy butterfly	Orange, black and white colors Mimics monarch butterfly	Müllerian mimicry Behavioral adaptation	Possesses colorful coloration as warning. Reduces impact that would exist on a sole species.
Penguin	Black and white feathers Layer of fat beneath the skin Pico largo	Structural adaptation Physiological adaptation Structural adaptation	Form a rigid exterior and a soft coat in their bodies. To obtain energy and heat To catch prey
Cactus	Superficial root system with hairs Thorns are reduced leaves Bulky stem.	Structural adaptations	To catch and absorb surface water. Avoids water loss Most of the photosynthesis takes place there
Frog	Vibrant colors (yellow, black and white)	Behavioral adaptation	Warning coloration for predators
Hummingbird	Small Long, thin beak	Structural adaptations	Eases flight when eating To extract nectar

Juego Memory

Two-headed snake	Part of its body mimics the other part	Self-mimicry Behavioral adaptation	To increase its survival chances
Tree	Deep root system Larger leaves	Structural adaptations	Absorb deep waters Most of the photosynthesis takes place there
Geese	Fly in groups Migrate	Behavioral adaptation Physiological adaptation	Protection To look for food
Chameleon	Mimics coloration of the vegetation in which it's located	Behavioral adaptation	Trick other animal's senses, inducing a determined behavior upon them.

How do adaptations help animals and plants survive in their environment?