



DAVID ATTENBOROUGH LYREBIRD

- Essential Question
 - Why do animals need to adapt?

INTRODUCTION TO THE ANIMAL KINGDOM

- **Animals are in Kingdom Animalia**
 - Multicellular
 - Eukaryotic heterotrophs
 - Cells lack cell walls



WHAT IS AN ANIMAL?

- **Invertebrates** - animals that do not have a backbone, or vertebral column
- **Vertebrates** - animals with a backbone



WHAT ANIMALS DO TO SURVIVE

• Animals carry out the following essential functions:

- Feeding
- Respiration
- Circulation
- Excretion
- Response
- Movement
- Reproduction



WHAT ANIMALS DO TO SURVIVE

• Feeding

- Most animals cannot absorb food, instead, they ingest (or eat) it



WHAT ANIMALS DO TO SURVIVE

• Respiration

- Whether they live in water or on land, all animals respire, they take in oxygen & give off carbon dioxide



WHAT ANIMALS DO TO SURVIVE

• Circulation

- Small animals rely on diffusion to transport nutrients
- Large animals have a circulatory system to move nutrients around



WHAT ANIMALS DO TO SURVIVE

• Excretion

- Most animals have an excretory system that eliminates wastes, maintaining homeostasis

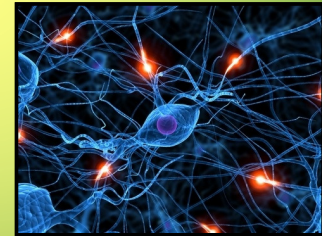


Scientific Name for poop: Scat

WHAT ANIMALS DO TO SURVIVE

• Response

- Animals respond to events in their environment using specialized cells called nerve cells



WHAT ANIMALS DO TO SURVIVE

• Structure/Movement

- Most animals are motile, meaning they can move around



WHAT ANIMALS DO TO SURVIVE

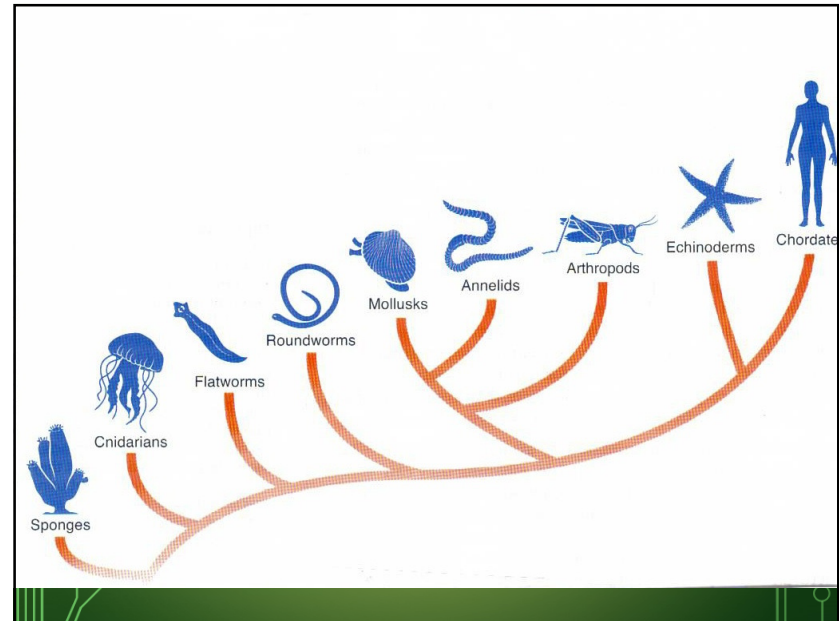
• Reproduction

- Most animals reproduce sexually, which helps create & maintain genetic diversity in populations
- It improves the species ability to evolve when the environment changes



TRENDS IN ANIMAL EVOLUTION

- Complex animals tend to have:
 - Internal body organization
 - Bilateral body symmetry
 - A front end or head with sense organs



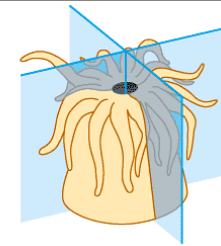
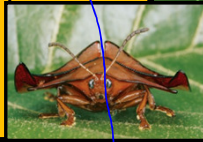
TRENDS IN ANIMAL EVOLUTION

• Body symmetry

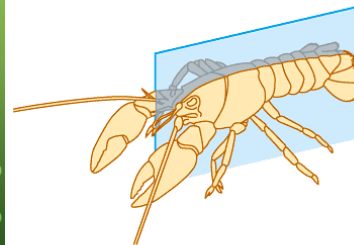
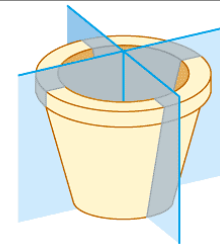
- **Radial symmetry** – All parts are equal no matter where you draw a line.
 - similar to a bicycle wheel

- **Bilateral symmetry** - a single imaginary plane can divide the body into 2 equal sides

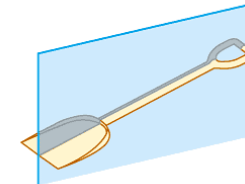
*splits an animal into mirror-image sides.



(a) Radial symmetry



(b) Bilateral symmetry



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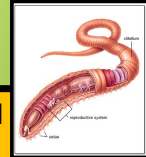
TRENDS IN ANIMAL EVOLUTION

- **Cephalization** - the concentration of sense organs & nerve cells at the front end of the body



FORM & FUNCTION IN INVERTEBRATES

- Invertebrates have 1 of 3 main kinds of skeletal systems: hydrostatic skeletons, exoskeletons, or endoskeletons
- Most invertebrates reproduce sexually during at least part of their life cycle
 - Depending on environmental conditions, however, many invertebrates may also reproduce asexually



Sponges
Sea Anemones



BODY TEMPERATURE & HOMEOSTASIS

- **Homeostasis:** the control of body temperature is important for maintaining homeostasis in vertebrates.
 - Particularly in habitats where temperature varies widely with time of day & with season



Ex: The internal control of body temperature allows emperor penguins to live in cold Antarctic climates, where their feathers act as insulation



BODY TEMPERATURE & HOMEOSTASIS

- **Ectotherm** - the body temperature is determined by the temperature of the environment..
 - The animals pick up heat from, or lose heat to, their environment.
- Most reptiles, fishes, & amphibians



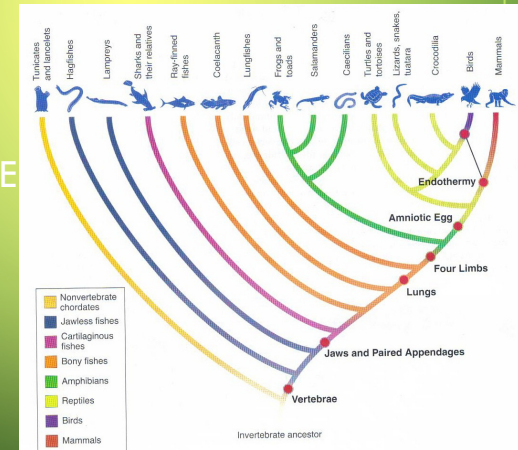
BODY TEMPERATURE & HOMEOSTASIS

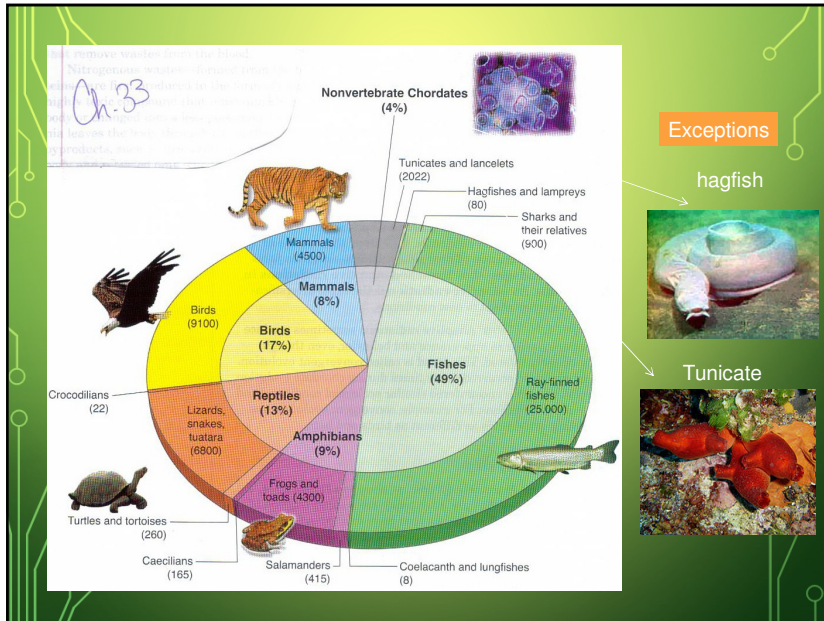
- **Endotherm** - an animal whose body temp. is controlled from within
 - They can generate & retain heat inside their bodies
- Birds & mammals



FORM AND FUNCTION OF CHORDATES

THE CHORDATE FAMILY TREE





FORM AND FUNCTION OF CHORDATES

Respiration:

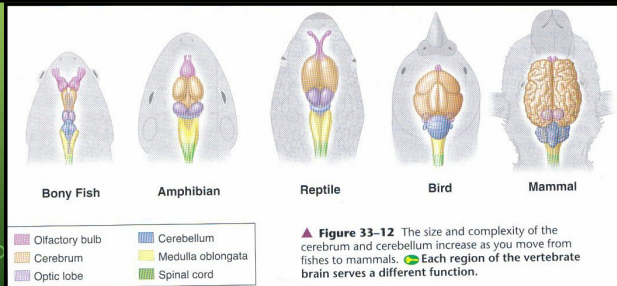
- As a general rule, aquatic chordates (tunicates, fishes, & amphibian larvae) use gills for respiration
- Land vertebrates (adult amphibians, reptiles, birds, & mammals) use lungs



FORM AND FUNCTION OF CHORDATES

Response:

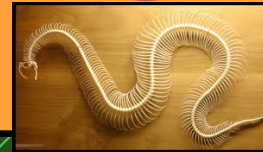
- Non-vertebrate chordates have a simple nervous system with a mass of nerve cells that form a brain
- Vertebrates have a more complex brain with distinct regions, each with a different function



FORM AND FUNCTION OF CHORDATES

Movement:

- The skeletal & muscular systems support a vertebrate's body & make it possible to control movement



Reproduction:

- Almost all chordates reproduce sexually
- Vertebrate evolution shows a trend from external to internal fertilization



ANIMAL BEHAVIOR: STIMULUS & RESPONSE

- Behavior - the way an organism reacts to changes in its internal condition or external environment
- Ex.) turning your head toward a sound, or washing your food



STIMULUS & RESPONSE

- Stimulus - any kind of signal that carries info. & can be detected
- Response - a single, specific reaction to a stimulus
 - Ex.) waking up to an alarm



STIMULUS & RESPONSE

BEHAVIORAL RESPONSES TO STIMULI MAY BE ADAPTIVE.

- Detecting and responding to stimuli is key to an individual's survival.
- Internal stimuli tell an animal what is occurring in its own body.
 - hunger
 - thirst



STIMULUS & RESPONSE

- EXTERNAL STIMULI GIVE AN ANIMAL INFORMATION ABOUT ITS SURROUNDINGS.

Types of External Stimuli

- Sound
- sight
- changes in day length or temperature



STIMULUS & RESPONSE

- When an animal responds to a stimulus, body systems (including sense organs, nervous system, & muscles), interact to produce the resulting behavior



STIMULUS & RESPONSE

- Moths will usually rest with their front wings over their hind wings
- If disturbed, the moth will move its front wings to expose a striking circular pattern on their hind wings



INNATE BEHAVIOR

- Innate behavior - instinct, or inborn behavior
- Innate behaviors appear in fully functional form the first time they are performed, even though the animal may not have had any previous experience with the stimuli to which it responds



LEARNED BEHAVIOR

- Learning - behaviors that develop over time aka. (acquired behaviors)
- The 4 major types of learning are
 1. Habituation
 2. Classical conditioning
 3. Operant conditioning
 4. Insight learning



LEARNED BEHAVIOR

1. Habituation - when an animal decreases or stops its response to a repetitive stimulus that neither rewards nor harms the animal

- Example: Animals stop giving alarm calls when they become familiar with other species in their environment that turn out not to be predators.



2. Classical conditioning - when an animal makes a mental connection between a stimulus & some kind of reward or punishment

- Ex.) Pavlov's dog

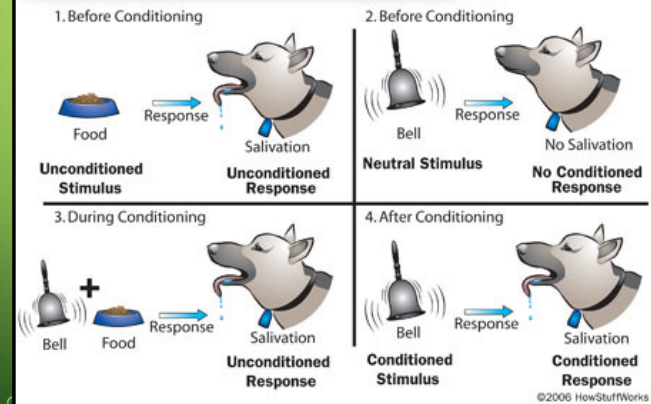


"AND THEN INSTEAD OF FEEDING ME HE WOULD RING A LITTLE BELL."

[CLASSICAL CONDITIONING VIDEO](#)

PAVLOV'S DOG

How Dog Training Works



LEARNED BEHAVIOR

3. Operant conditioning - when an animal learns to behave in a certain way through repeated practice, in order to receive a reward or avoid punishment

Positive or Negative Reinforcement



[Operant Conditioning Video](#)

LEARNED BEHAVIOR

4. Insight learning – (reasoning) - occurs when an animal applies something it has already learned to a new situation, without a period of trial & error

EX: CHIMPANZEE STACKING BOXES TO REACH BANANAS HANGING FROM CEILING



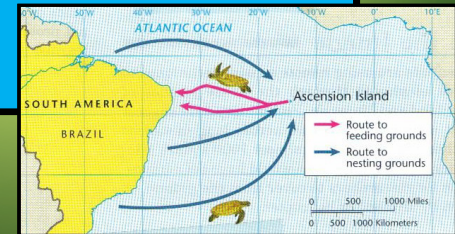
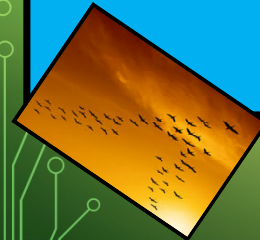
INNATE & LEARNED COMBINED

- **Imprinting** - involves both innate & learned behavior.
 - Young animals have an innate urge to follow the first moving object they see, but are not born knowing what that object will look like



PATTERNS OF BEHAVIOR: BEHAVIORAL CYCLES

- Many animals respond to periodic changes in the environ. with daily or seasonal cycles of behavior
- **Migration** - the periodic movement from one place to another & then back again



BEHAVIORAL CYCLES

- **Circadian rhythms** - behavioral cycles that occur in daily patterns
 - Ex.) sleep at night, attend school during the day
- **Hibernation**—a dormant state in response to cold temperatures



SOCIAL BEHAVIOR

- Often members of a society are closely related to one another
 - Share a large proportion of each other's genes
 - Helping a relative survive increases the chance that the genes an individual shares with that relative will be passed along to offspring
 - Animal societies enhance the reproductive success of individual members
- **Altruism**—one individual reduces its own fitness for the good of the population. Ex: Bees



COURTSHIP



- **Courtship** behavior is part of an overall reproductive strategy that helps animals identify healthy mates

- To pass along its genes to the next generation, animals need to reproduce sexually



COURTSHIP

- Individual sends out stimuli (like sounds, visual displays, or chemicals) to attract a mate

- **Pheromone**- chemicals released (often to announce readiness to mate)



COMPETITION & AGGRESSION

- **Territory** - a specific area that is occupied & protected by an animal or group of animals
- When 2 or more animals try to claim limited resources, such as a territory or food, competition occurs



COMPETITION & AGGRESSION


- During competition, animals may also show aggression
- **Aggression** - a threatening behavior that one animal uses to gain control over another





COMMUNICATION

- Communication - the passing of information from one organism to another
- Animals may use visual, sound, touch, or chemical signals to communicate with one another





COMMUNICATION

- Language - a system of communication that combines sounds, symbols, or gestures according to sets of rules about word order & meaning (grammar & syntax)
 - It is the most complicated form of communication

