3055 BA SANGAM COLLEGE

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WORKSHEET 22

School: **Ba Sangam College** Subject: **Biology**

Year:**13** Name:_____

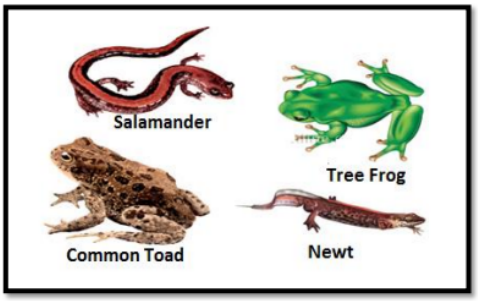
Strand	**13.3 Biodiversity Change and Sustainability**
Sub strand	**B13.3.2.6 Kingdom Animalia**
Content Learning Outcome	Describe the characteristics that classify organisms in this kingdom to different categories; and explore the increasing complexities of the different groups from simple organisms to complex chordates

CLASS Amphibian - e.g. frogs, toads and salamanders

• Probably evolved from lobe – finned fish and were the first vertebrates to walk on land.
• Are cold blooded (poikilothermic).
• Undergo metamorphosis from an aquatic larval form to terrestrial adult form.
• Have a moist smooth skin with no scales.
• Feet are webbed and toes are clawless.
• Use gills, lungs, skin and mouth cavity for mouth respiration.
• Larvae has 2 chambered heart while adult has 3 chambered heart with well-developed circulation.
• Eggs are laid lack shells – fertilization is external.
• May enter a stage of dormancy e.g. hibernation in winter and estivation in summer.

Adaptations to Life on Land

• As the amphibians developed in the late Devonian Period 360 mya they needed to adapt to terrestrial life.
• Amphibians dominated the Carboniferous Period 345 to 285 mya
• Breathe using lungs, not gills.
• Bones in limbs allow movement.
• Ribs to support and protect internal organs.
• Amphibians have a well-developed digestive system similar to that of humans
• As most amphibians develop lungs as adults, some are lung-less and only breathe through their skin
• They have closed circulation and a 3 chambered heart with a double loop system similar to that of a human
• Ammonia is disposed of in urine through the use of kidneys



Reproduction

• Most amphibians lay their eggs in water; fertilization is external • Some salamanders fertilize internally
• In most cases of external fertilization, the male will attach itself to the female. Eggs and sperm are released simultaneously and encapsulated in a jelly that attaches to aquatic plants.
• The jelly nourishes the developing embryos
• Tadpoles hatch and metamorphose into adults
• Most amphibians abandon their eggs once they lay them.
• Some care for both eggs and young
• Some incubate their eggs in unusual places: in their mouth, on their back, or in their stomach

Senses

• Amphibians have a well-developed brain and spinal cord similar to that of a fish
• Eyes are protected by a nictitating membrane
• A tympanic membrane, or eardrum, is located on either side of the head
• Many have a lateral line system similar to that of a fish

CLASS Reptilia
• The oldest reptile fossils date back to the early Carboniferous Period some 350 million years ago
• Dinosaurs of the Triassic and Jurassic Period ruled the earth until 65 million years ago
• Reptiles have evolved from primitive amphibians.
• Terrestrial – have internal fertilization and lay shelled eggs (amniotic eggs). They do not need water for reproduction as the amphibians.

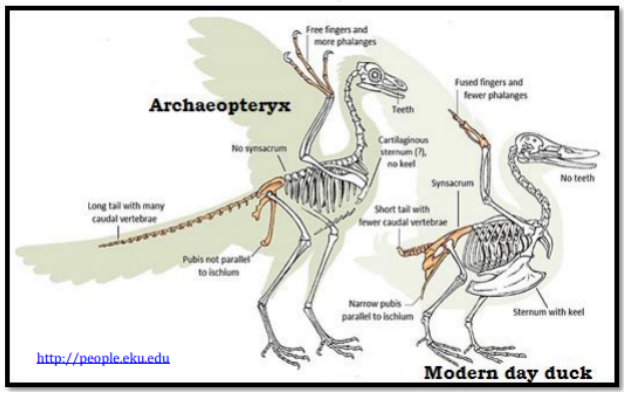
Body Systems
• Reptiles are ectotherms – rely on interactions with the environment to control their body temperature
• Reptiles have well developed lungs, four chambered hearts, and a well-developed brain and spinal cord
• Reptiles' legs are rotated farther under their body than amphibians allowing them to carry weight and walk on land more efficiently
• Legs are larger and stronger to support weight and rapid movement; amphibians legs are weaker and unable to support weight.
• Lungs of reptiles are more developed than lungs of amphibians.
• Reptiles have 4 chambered heart; amphibians have 3 chambered heart where mixing of oxygenated and deoxygenated blood takes place.
• Skin is covered by scales or plates for protection and to prevent desiccation.
• Kidney excretes insoluble uric acid which allows reabsorption of water.
• Are poikilothermic.

Reproduction
• Internal Fertilization – males have a penis to place sperm in the female's cloaca
• Most are oviparous - Turtles leave their nests unattended while alligators protect their nest
• Some snakes are ovoviviparous
Reptilian Eggs
• A critical evolutionary development for terrestrial animals is the reptilian amniotic egg.
• The developing embryo, protected from drying out, can survive outside of water and variety of habitats.
• The yolk sac provides nutrient rich yolk that feeds the embryo and the albumin supplies water and nutrients. Wastes are released to the allantois, an extension of the embryonic gut. Oxygen diffuses easily through the thin outer shell of the egg; gas exchange is regulated by chorion and the amnion produces watery environment around embryo.

CLASS Aves – birds Characteristics of most birds
• Maintain a constant internal body temperature
• Covered in feathers
• Have two legs for walking and perching
• Front limbs are wings
• Most are adapted for flight Adaptations for flight include:
1. Feathers: used for flight and warmth.
Types of feathers are:
• Contour Feathers: provide the lifting force and balance needed for flight
• Down Feathers: trap air close to the body and keep the bird warm
• Powder Down: found on ducks and other birds that live on or in water; release a fine powder that repels water
2. Reduction of body weight
3. Increase of power for flight
4. Pelvis fused to sacrum- reduces tail
5. No external ear lobes; eardrums deeply recessed
6. NO external genitalia – most don't have a penis; some like ducks and geese do; fertilisation is internal; gonads reduced except during breeding season
7. Metanephritic kidney; urinary bladder; urine is semisolid, uric acid, and immediately voided 8. Skeletal system is streamlined- skull bones fused, bones with air cavities; very light, vertebrae tend to be fused, neck vertebrae lock during flight 9. Lungs developed anteriorly and posteriorly into air sacs that give birds additional buoyancy and an additional supply of oxygen

Evolution of Birds

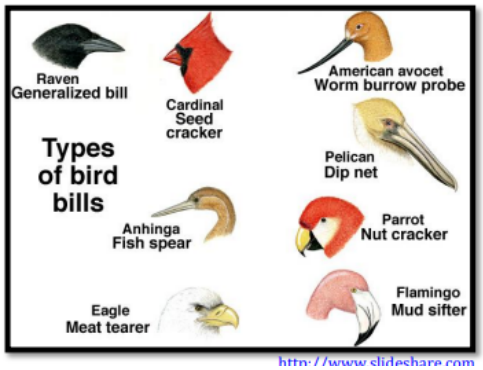
7• Oldest known fossil is Archaeopteryx which lived during the Jurassic Period 150 mya.
• Archaeopteryx had a large skull with teeth in its beak, three claws on each wings, flat sternum (breastbone) belly ribs (gastralia) and a long bony tail (reptile like characteristic).
• It had feathers, a lightly built body with hollow bones, reduced fingers and a fused collar bone (bird like characteristic).



System

Body System
• homeothermic: can generate their own body heat; warm-blooded
• Smaller birds must eat more in relation to its size due to Surface Area to Volume Ratio

Feeding habits of Birds
• They lack teeth and therefore do not chew
• Beaks are adapted to the types of food they eat
• Bird Digestion
- Crop: enlargement of the esophagus used to store food
- Gizzard: has muscular walls and small bits of gravel used to grind food
• Bill/beak variation led to diversification in birds



Respiration
• Birds have very efficient lungs that provide oxygen rich blood during both inhalation and exhalation
• Inhaled air enters posterior and anterior air sacs it then travels through the lungs and is exhaled
• Therefore the air flows into the air sacs and out of the lungs in one single direction, always providing oxygen rich air.

Circulation and Excretion
• complete separation of oxygenated and deoxygenated blood
• Two loop circulatory system, similar to that of humans
• Ammonia is removed by the kidneys, converted to high concentration uric acid and defecated (bird droppings); similar to reptiles

Senses of Birds
• The brains of birds are very well developed: able to detect color and hear well. However, their sense of smell or taste is no well developed

Bones and Muscles
• Most birds can fly. Others are adapted for swimming and running
• Bones are light, strong, and adapted for flight; many bones are fused to provide a study base for flight adaptations

Reproduction
• Both male and female reproductive tracts open into the cloaca
• The sex organs, internal in both sexes, increase in size during mating season
• Birds rub their cloacas together during mating to transfer sperm. Eggs and Incubation
• Eggs are amniotic but unlike reptile eggs have a hard outer shell
• Eggs must be incubated by the parents since they are endotherms
• Young must be cared for after hatching
• There are nearly 30 different orders of birds
• 60% of all birds worldwide are perching birds

Aspects of communication in birds
1. Well-developed vocal cords - sound for courtship - and warning for protection; - calls species specific
2. Most are very brightly colored

- has to do with species recognition,
- heat control (light vs dark coloration),
- Camouflage

Ecology of Birds

♣ Birds are very ecologically important

♣ Humming birds are involved in pollination Some birds eat seeds without digesting them and therefore spread the seeds

♣ Many birds keep insect populations in check

♣ Birds are good indicators of environmental health; bird numbers dwindled with the use of DDT Migration - great long distance movement

• Reasons-breeding, molting, seasonal changes (i.e. food)

• have established flight routes

• navigate by coastlines and rivers electromagnetism stars (celestial)

• at this time is when birds build up fat supply - may migrate thousands of miles and not eat in the process - Stimulus for migration: lengthening of days stimulate gonad development and fat storage allows bird to migrate north; shortening of days in fall initiates south migration; not all birds migrate

CLASS Mammalia

There are more than 4,000 different species of mammals. The smallest is the hog-nosed bat, which weighs 0.05 ounces. The largest is the blue whale, which can be 100 feet long and weigh 150 tons. But whether they live on land or water, all mammals share some common characteristics.

Characteristics of mammals

• Endotherms/ homoeothermic

• Have mammary glands. Females secretes milk from mammary glands to feed the young.

• Have hair or fur • Have a four chambered heart.

• Have four different types of teeth.

• Most species are viviparous; i.e. female carry their young in uterus, where development takes place and give birth to live young.

• Have a highly developed brain. Caring for Young

• All newborn mammals feed on their mother's milk • Some newborns are helpless at birth and must be cared for Others are able to see and walk within minutes after birth Mammal Reproduction

• Internal Fertilization occurs in mammals

• Mammals are divided into three groups based on methods of development and birth

I. Monotremes e.g. duck-billed platypus, spiny anteater.

- Monotremes are the egg laying mammals (oviparous)
- Females secrete milk and suckle the young. - They share two notable characteristics with reptiles
- Both the reproductive and urinary systems open into a cloaca
- "Monotreme" means single opening - Only three species of monotremes exist today: they are found in Australia and New Guinea
- Duckbill Platypus and two species of Spiny Anteaters
- Monotremes lay eggs that are incubated outside the body
- They hatch into young animals in about 10 days
- The young are nourished by their mother's milk that they lick from pores on the mother's abdomen

II. Marsupials e.g. opossum, kangaroo wombats, koalas, and Tasmanian devils

- Marsupials give birth to premature young that complete their development in an external pouch
- A short time after internal fertilization a small embryo leaves the mother's body, crawls across the fur, and enters the marsupium (pouch) where it attaches to a nipple to nurse.

III. Placentals e.g. humans, cats, cows

- The young are fully developed in the uterus.
- The embryo obtains its nourishment from the mother by the way of the placenta.
- Placenta – organ in placental mammals through which nutrients, oxygen, carbon dioxide, and wastes are exchanged between embryo and mother
- Gestation – the time it takes from conception to birth in mammals (can vary from 2 weeks to 2 years depending on the mammal)

Orders of Mammals

• There are 12 orders of placental mammals

• They are classified based on several criteria including

- Feeding
- Teeth and Jaw Structure
- Foot Structure
- Brain Development

ACTIVITY

1. How can the tubular-dorsal nervous system in chordates be compared to the nervous pattern present in invertebrates? (2M)

2. How do chordates reproduce? (1M)

3. Into which subphyla are protochordates divided? What are some representative species of each protochordate subphylum?(2M)

4. What are the six criteria used to determine the evolutionary branch of vertebrates?(1M)