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The Animal Kingdom

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At Troup Magnet Academy of Sciences, we are entering a new phase in our magnet school's philosophy—Library Power. Since America has entered the Informational Era, we as teachers must provide our students with the necessary skills to find information in a variety of ways. Therefore, in planning our future curricula we must incorporate the use of the library media center's technology and resources in our lessons. Hopefully, at the end of our student's tenure at Troup, they will be able to use the library as an additional tool for learning and enjoyment.

The curriculum unit, "The Animal Kingdom" is designed to be used with students in grades five through seven. The students will be introduced to several phyla of animals where they will explore their habitats, classify them according to their structure, present oral reports from their research on a particular phylum and perform scientific investigations with different species of animals.

In continuing with the "hands-on" approach in teaching science, I will include several scientific investigations which integrate social studies, literature and language. My overall expectation of this curriculum unit is to provide my colleagues with ideas to develop a thematic unit and enough background information where they will enjoy teaching about the Animal Kingdom, and pass their enthusiasm on to their students.

"The Animal Kingdom" will address the following concepts:

1. The Taxonomic System
11. The Animal Kingdom
111. Vertebrate Animal Phylum
 - (A) Phylum Chordata
 1. Class Aves
 2. Class Fish
 3. Class Reptilia
 4. Class Mammalia
 5. Class Amphibia
- IV. Invertebrate Animals Phylum
 - (A) Phylum Porifera
 - (B) Phylum Cnidaria
 - (C) Phylum Platyhelminthes

- (D) Phylum Nematoda
- (E) Phylum Annelida
- (F) Phylum Mollusca
- (G) Phylum Arthropoda
- (H) Phylum Echinodermata

The prose section of the curriculum unit will provide teachers with information on all the previously mentioned phyla and classes of animal. After reviewing the background information for a particular phylum, an appendix with a list of activities which your class can perform with each group of animals. The lesson plan portion of the unit will include research and investigative type of activities which our students can perform as independent study or group assignments.

The Animal Kingdom

Approximately two million different species of animals have been identified on Planet Earth and ten thousand more species of animals are discovered every year. They have been classified into nine major phyla—eight phyla being invertebrates (animals without a backbone). The one phylum of vertebrates (animals with a backbone) is further classified into five different classes—mammals, birds, fish, reptiles and amphibians.

Sounds complicated—not really! In order for scientist to discover and study animals they must be classified into a group according to resemblance and differences using pre-established rules. The branch of science which deals with the classification is called taxonomy or systematic zoology.

The Taxonomy System

Kingdom Animalia is the largest of the five existing kingdoms on Planet Earth. The scientific classification

system is divided into seven major groups, (1) kingdom, (2) phylum or division, (3) class, (4) order, (5) family, (6) genus, and (7) species. The kingdom is the largest group and a species is the smallest. In the Animal Kingdom, the term phylum is used, and it is the second largest group.

Classes have more characteristics in common than animals in a division or phylum. For example, amphibians, reptiles, and birds belong to the phylum Chordata. However, each of the animals belong to a different class. Amphibians belong to the class of Amphibia which consist of frogs, toads and salamanders. Reptiles belong to the class Reptilia which consist of snakes, crocodiles and alligators. Birds belong to the class Aves.

An order is made up of animals that have more features alike that those in a class. In the class Mammalia, all animals produce milk for their young. Cats, dogs, raccoons and shrew are all mammals. Dogs, cats and raccoons eat flesh are grouped together in an order called Carnivora with other flesh-eating animals. Shrews eat insects, and are classified in the order insectivora with other insect-eating animals.

A family consists of animals that are even more alike than those in an order. Wolves and cats are both in order Carnivora. But wolves belong to the family Canidae and cats belong to the family Felidae. The family Canidae consist of animals with long snouts and bushy tails, whereas animals in the family Felidae have short snouts and short-haired tails.

A genus consists of animals with very similar groups, but members of different groups usually cannot breed with one another. Both the coyote and the timber wolf belong to the genus Canis. But coyotes and timber wolves generally do not breed with one another.

A species is the basic units of scientific classification. Animals of a species have many similar features and characteristics alike, but they are different from all forms of life in one or more ways. Members within a species can breed with one another, and their young grow to look very much like the parents. Each member in a species is assigned a scientific name. The coyote's scientific name is *Canis latrans*, and the gray wolf is *Canis lupus*. Scientist sometimes group animals within a species into even smaller groups because they have another distinctive feature. These groups are called subspecies or varlebes.

II. Introduction

An invertebrate is an animal without a backbone or vertebral column. The vertebral column are made up of small bones called vertebrae. The scientific name assigned to animals without backbones is Invertebrata, meaning without vertebrae. There are more than one million known species of invertebrate and about forty thousand species of vertebrate animals. Due to the large variety of invertebrates, scientists have divided them into seven major groups called phyla. The phylum Echinodermata consist of a group of animals with external spines, such as the sand dollar, starfish, sea urchin, Portuguese-man-of-war, and the sea cucumber. The phylum Porifera contain animals with pores all over their bodies known as sponges. The phylum Coelenterata, also called Cnidaria includes animals such as the hydra, jellyfish, sea anemone, and the coral. These animals are characterized by having special stinging organs called nematocysts. The phylum Mollusca is made up of animals called mollusks. Some examples of mollusks include snails, slugs, scallop, octopus and clams. These animals are characterized as having soft body and usually have limy shells.

There are three different phyla of worms, the Platyhelminthes, Annelida, and Nematoda. The phylum

Platyhelminthes include worms with flattened bodies, such as the planarian, tapeworm and liver fluke. Phylum Nematoda include all the roundworms such as the ascaris, pinworm, hookworm, stomach worm and the trichina or pork worm. Phylum Annelida includes worms with bodies made of segments such as the sandworm, leech and the earthworm. Phylum Arthropoda is the largest of all the phyla of animals according to the number of species in this particular group. Arthropods are characterized as animals with jointed legs and a hard external skeleton made of chitin. Animals in this group include spiders, insects and crustaceans.

Unlike the invertebrates, vertebrate animals have a backbone. Most vertebrates have a spinal column made up of tiny bones called vertebrae. However, some vertebrates do not have a spinal column made up of tiny rigid bones. Animals such as the shark have a vertebrae made up of cartilage. All vertebrates are bilaterally symmetrical meaning that the left and right sides of the body are alike. Their bodies are usually divided into a head and trunk.

There are about forty thousand species of vertebrates placed into one phylum, Chordata, which is divided into eight different classes: (1) class Aves (birds), (2) class Fish, (3) class Reptilia (reptiles), (4) class Mammalia (mammals), (5) class Amphibia (amphibians).

Throughout the remainder of the prose section of the curriculum unit, “The Animal Kingdom”, I will elaborate on each of the phyla presented in the introduction. As I previously mentioned, animals are characterized by their structure so I will tend to concentrate most of the information towards that particular area. Within each phylum some animals display unique characteristics causing them to be further broken down into classes. Therefore, I will also present the reader with vital information concerning certain classes within a phylum. Once each phylum is covered by the instructor, a group of scientific investigations and other activities will be provided in Appendix 2 at the end of the unit to reinforce the information presented in this unit.

Phylum Mollusca

The animals in this particular phylum are known as mollusks. Mollusks make up the largest group of water animals even though some classes of mollusk can be found in hot, dry environments and forest habitats. However, mollusks must keep their bodies moist in order to stay alive. Most of the mollusks that live on land can be found in damp places such as in the soil or underneath logs, rocks or leaves.

Mollusks are characterized as having a soft, fleshy body, which, in many species, is covered with a hard shell. There are seven classes of mollusks which have been identified by scientist, but I will discuss the following three classes in this unit: (1) univalves, or class Gastropoda, (2) bivalves, or class Bivalvia, (3) head-footed, or class Cephalopoda. These are the most popular mollusks within this phylum. The common name for each group so that the scientific name will not intimidate the audience for which this paper is intended.

Class Gastropoda

Univalves are the largest class of mollusks. The term, univalve, comes from the Latin word meaning one shell. Animals in this group includes snails, slugs, limpets and whelks. Univalves such as the sea and garden slug called nudibraches have no shell after the larval stage. The scientific name Gastropoda comes from the Greek word meaning belly and foot.

Most people tend to think that univalves crawl around on their bellies, but they actually move around on a large, muscular foot. In addition to locomotion, the foot is covered with a lid-like part called an operculum which protects the univalve by enclosing the animal in its shell when in danger. The head region of univalves generally contains the mouth and sense organs such as tentacles. Certain univalves have two sets of

tentacles on their head. One set is used to help the animal feel their way about, and the other set holds the eye of the animal. Univalves also have a ribbon of teeth called a radula. The radula works like a rough file and tears apart the animal's food

The rest of the body contains various organs involved in reproduction, circulation, digestion, and other important processes. Covering most of the univalves' body is a soft mantle. The mantle produces the material that makes up the hard shell. As the animal grows, the mantle becomes larger in order to house the animal.

Class Bivalvia

Bivalves make up the second largest class of mollusks. Clams, mussels, scallops, oysters and shipworms are a few examples of the animals in this class. Bivalves have two shells held together by a strong muscle. The shell usually remain open unless the animal senses danger, then the muscle closes the shell tightly for protection. They have a well-developed head with eyes, and one or two pairs of tentacles. Most are marine, but some live in fresh water or on land.

Bivalves are also characterized by having a strong muscular foot. Most of the animals use this foot for locomotion. However, bivalves such as clams use their foot to dig holes by pushing it downward into the mud or sand. The foot swells to enlarge the hole, and then it contracts and pulls the shell into the burrow. These animals breathe and feed through a muscular tube called a siphon. They feed on plant cells material, which is filtered from the water by the gills.

Class Cephalopods

Cephalopods are characterized as having large heads with long tentacles and conspicuous eyes. For this reason, Cephalopods are known as head-footed mollusks. Octopuses, squids and nautilus are some of the animals which make up this particular group of animals.

Head-footed mollusks are the most highly developed animal within the phylum Mollusca. Most head-footed mollusks do not have an external shell, but do have some part of a shell within their body. These animals are fast swimming, active predators with highly developed eyes and nervous system.

These animals use a water propulsion system for movement. They force water out of a tube in one direction, which pushes them along in the opposite direction. In addition to their speed, these animals have highly developed defense mechanisms. Squids and octopuses have an ink sac which secretes a purple dye blinding their predator. Leaving them confused, the head-footed mollusks escape. Some of the mollusks in this class have the ability to change the color of their skin, thus camouflaging the animal from their enemy.

Phylum Porifera

This phylum contain pore-bearing animals known as sponges. There are approximately three hundred thousand species of sponges. They live in aquatic, mainly marine habitats. They grow attached to rocks and other debris on the ocean floor. For a long time scientist thought that these animals were plants because they lack the ability to move about like other animals. Poriferans are the most simplest of the invertebrate animals in structure.

Sponges are divided into three different classes according to their skeletons: (1) chalky, (2) glassy, or (3) spongin—a protein material. The skeleton protects and supports the sponge's body. The body of a sponge resembles a sac full of holes called pores. Water carrying food and oxygen enters through the pores. These

substances are taken in through the central cavity called the spongocoel, where food and oxygen is filtered out and waste is passed through the top opening. The spongocoel also houses several flagellated (whiplike organs) which forms currents to keep water flowing through its pores.

Sponges also possess the ability to regenerate, or regrow old body parts. When the cells of a sponge are torn apart or separated, they reaggregate to form a complete sponge again. If clusters of different species of sponges were placed in isolated containers of sea water, they would reorganize and sort themselves out and produce a new sponge of each class.

Phylum Cnidaria

There are about ten thousands species of cnidarians. Fresh water hydras, jellyfish, sea anemones, and corals are just a few examples of some of the animals which belong to this particular phylum. This phylum is also known as coelenterates.

There are three different classes of cnidarians: (1) class Hydrozoa, which includes the hydras; (2) class Scyphozoa, which includes the jellyfish; and (3) class Anthozoa, which includes sea anemones and corals. All the animals within this group are characterized as having tentacles with stinging cells. They have only one opening into their digestive cavity. This opening has to serve as both the mouth and anus. Their body walls are made up of at least two layers. The outer layer forms the body covering called an ectoderm, and an inner called an endoderm which lines the digestive cavity. Some cnidarians possess a third layer consisting of a stiff, jellylike material which helps support the animal.

Cnidarians are usually shaped like a polyp, or medusa. The hydra has the polyp form which sort of resembles an elongated jellyfish. Most cnidarians are shaped like polyps during their larval stage, and develop into the medusa form later in its life. The medusa, or jellyfish shaped cnidarians have a bell or umbrella-shaped body. Their mouths are found underneath their bell-shaped heads, which are usually surrounded by tentacles with stinging cells.

Phylum Arthropoda

Arthropods are the most successful group of animals. More than eight hundred thousand species of living arthropods have been identified, and more probably exist. About eight percent of all animals belong to this group—other classes of arthropods include (1) class Arachnida—spiders, ticks and mites; (2) class Crustacea—lobsters, crabs and barnacles; (3) class Chilopoda—centipedes; and, (4) class Diplopoda—millipedes.

Arthropods possess a hard external shell called an exoskeleton. It is made up of a stiff material called chitin. Arthropods are characterized by their paired, jointed appendages, which are often specialized to perform a certain function. Their bodies are segmented, and usually possess a well defined nervous and circulatory system.

Five of the six major classes of arthropods are characterized as follows:

- (1) Class Arachnida includes the spiders, mites, scorpions, and ticks. The arachnid body is divided into two parts, a cephalothorax (fused head and thorax) and abdomen. They also have four pairs of walking legs. Many types of arachnids have glands that secrete silk used for making webs.
- (2) Class Crustacea includes crabs, lobsters, and barnacles. Their bodies, like the arachnids, are

divided into two parts—a cephalothorax and abdomen. Crustaceans have mandibles (mouth parts used for chewing) and two pairs of antennae (sensory appendages). Many have five pairs of walking legs.

(3) Class Insecta is made up of insects. An insect's body is divided into three parts—the head, thorax and abdomen. There are three pairs of walking legs attached to the thorax, and sometimes one or two pairs of wings. These animals also possess one pair of antennae, and a mandible.

(4) Class Chilopoda includes the centipedes. The body of a centipede consists of a head and a series of many segments. Depending upon the species, a centipede can have up to one hundred eight-one segments. With the exception of the first and last two segments, each segment possess a pair of walking legs. The first segment contain a pair of poisonous claws used to capture insects for prey. Centipedes have one pair of antennae and mandibles for chewing. (5) Class Diplopoda consists of the millipedes. The millipede body contain a head, short thorax, and an abdomen consisting of anywhere from nine to one hundred segments. Each segment may have two pairs of legs. Like the centipede, millipedes have mandibles and one pair of antennae.

Worms

Worms are characterized as animals which have long, slender soft bodies with no backbones or legs. They are classified according to the shape of their bodies. There are four different phyla of worms: (1) Phylum Platyhelminthes (flatworms); (2) Phylum Nematoda (roundworms); (3) Phylum Annelida (segmented worms); and (4) Phylum Nemertea (ribbon worms).

Phylum Platyhelminths

Flatworms are the least complex of the four groups of worms. They have sensory organs concentrated at one end of its body—the head. Three classes of flatworms have been identified: (1) class Turbellaria—the free living flatworms such as planarians; (2) class Trematoda—the parasitic worms such as flukes; (3) class Cestoda—tapeworms. Flukes and tapeworms are notorious parasites that live in humans and domestic animals.

Free-living flatworms are found in ponds, lakes, streams and oceans. They feed on both dead and living plant and animal matter. The most popular free-living flatworm, the planarian has the ability to regenerate. Their digestive system is composed of a single opening, a mouth connected to the pharynx, and branched intestines. Once nutrients are absorbed into the cells, the undigested food is eliminated through the mouth.

Flukes and tapeworms are parasitic flatworms which infect human beings and other domesticated animals. Since tapeworms absorb food directly from the wall of its host's (the animal on which it lives) intestine, they lack a digestive system. They also lack sense organs and a brain. However, they have a highly developed reproductive system. Their bodies consist of a long chain of segments called a proglottids, each segment is equipped with both male and female organs containing as many as one hundred thousand eggs. Most of these parasites have complex life cycles, spending their larval stage in the body of its host. They then move to another host to spend the remainder of its entire adult life. A person infected with tapeworms may display the

following symptoms: pain and discomfort, decreased appetite, weight loss, and other symptoms.

Phylum Nematoda

Roundworms are the largest phylum of worms with more than ten thousand species being identified. They are widely distributed in soil and both salt and fresh water. Many roundworms are free-living, but others are parasites such as the pinworm, ascaris, stomach worm, hookworms and the trichina (pork roundworm) that live in plants and animals. These worms are characterized as having long, cylindrical bodies that resembles of a piece of thread.

The life cycle of the parasitic worms in this phylum varies. For instance, The ascaris spends its adult life in the intestines of humans. Like the tapeworm, it has a highly developed reproductive system. However, their sexes are separate, and copulation takes place within the host. The female can lay up to two hundred thousand eggs which leave the body through human feces. In areas where sanitation is poor the eggs find their way into the soil. The soil is then used as fertilizer. People accidentally eat the eggs and become infected. The larvae hatch in the intestines and then journey through the body, ending up in the intestines. However, before it reaches the intestines, the larvae can cause a great deal of damage to the lungs and other tissues.

Pinworms most commonly infect children. These worms are less than 1.3 centimeters long, and live in the large intestine. The female pinworm migrates down to the anal region at night to deposit their eggs. Their eggs causes an irritation which the victim to itch the infected area, thus spreading the tiny eggs all over their environment. Eating with dirty hands speeds up the infection process. Mild infections may go unnoticed, but more serious infections may result in injury to the intestinal wall.

Phylum Annelida

This phylum is the second largest group of worms. Segmented worms have a cylindrical, elongated body that is partitioned into rings, or segments. They contain a pair of hard bristles on each segment called setae which are used for locomotion. In addition to their conspicuous segmentation, annelids are more complex than flatworms and round worms in several ways. They possess a spacious coelom, a closed circulatory system, an efficient excretory system and a closed circulatory system. The most popular segmented worm is the earthworm. They are usually used for dissection because they possess more advanced structures mentioned previously.

Segmented worms are divided into three classes. (1) Class Hirudinea is composed of the leeches. Most leeches are parasites which suck blood from other animals. At each end of the leech's body is a sucker used for locomotion and attachment. (2) Class Plochaeta includes marine worms such as sandworms and tubeworms. These worms have a distinct head with eyes and antennae. Each of its body segments has a pair of lateral appendages called parapodia which are used for locomotion. (3) Class Oligochaeta includes the earthworm as well as some freshwater worms. These worms lack a well-developed head and have no parapodia.

Phylum Chordata

The vertebrate animals which exist in this particular phylum are the most familiar to most students, and is credited with being the most diverse group of animals. Unlike the invertebrates previously discussed. Phylum Chordata contain five subgroups, or classes consisting of amphibians, reptiles, birds, mammals and fish. I will include a brief synopsis of these classes proceeding this introduction.

Class Amphibia

Amphibians are characterized as animals with smooth, moist skin which aids in respiration during the adult stage of their life. But they are best known for the unique characteristic living part of their life in water and part on land. Most amphibians can survive in terrestrial environments, but they must return to the water to reproduce. The eggs of amphibians are surrounded by a jelly-like substance when they are deposited into the water. This jellylike material would dry out if they were laid on land, thus killing their offspring.

Most amphibians hatch from eggs which are laid in water or moist ground. They start out their life in water as larvae. They move from the larval stage to adulthood in a process called metamorphosis. Some adult amphibians continue living in the water, but most live their adult life on land. However, they must return continue to live around water for two reasons: (1) They must return to the water to find their mates and produce their young; and (2) Amphibians breathe through their skin; therefore, their skin must remain damp in order for them to take in oxygen.

There are three subgroups, or orders of amphibians. (1) Order Anura (frogs and toads)—Frogs and toads have four legs and no tail. Their hind legs are strong and used for jumping. (2) Order Caudata (Salamanders)—Salamanders have no tail. They either have four or two short weak legs. (3) Order Apoda (Caecilians)—Caecilians have no legs and resemble large earthworms. These animals usually live in underground burrows, but some are aquatic.

Class Reptilia

Reptiles are more suited for terrestrial life than are amphibians. Some of the major characteristics of reptiles include: (1) They have dry-scaly skin, (2) They possess limbs suited for rapid locomotion. (3) They have copulatory organs that permit internal fertilization. (4) They lay eggs on land that has a leathery outer covering which prevent them from drying out on land.

There are four major classes of reptiles:

(1) Order Crocodylia (Crocodiles and Alligators)—These animals spend most of its time underneath the water with its eyes and nostrils above the surface. They can be differentiated by their snout. An alligator has a broad snout, whereas a crocodile have a narrower snout.

(2) Order Squamata (Lizards and Snakes)—Snakes are noted for their unusual method of capturing their prey. Some snakes are poisonous, and possess special glands that produce venom which they inject into their prey through special teeth called fangs. They also use their tongues to find their prey and for smelling. Lizards are different from snakes because they have legs, possess ears to detect sounds and most of them eat insects.

(3) Order Rhynchocephalia (Tuatara)—a single species of reptile only found in New Zealand.

(4) Order Chelonia (Turtles, Tortoises)—Even though these two reptiles look alike, their bodies are adapted to live together in two totally different environments. Since the turtle spends most of its time in the water, they possess paddle-shaped legs which they use for swimming. Whereas tortoises legs are stumpy and solid because they spend most of their time on land.

Class Fish

Fish are cold-blooded aquatic vertebrates with fins and gills. Even though fish come in a variety of shapes and sizes, most are torpedo-shaped (fusiform) so that they can travel efficiently through the water. Basically fish are classified into three basic orders: (1) Order Agnatha (Jawless Fish) such as lampreys and hagfishes. (2) Order Chondrichthyes (the Cartilaginous—skeleton fish) such as sharks and stingrays. (3) Order Osteichthyes (Bony Skeletal Fish)—Fish in this particular order possess a swim bladder that help them float at different levels in the water.

Fish breathe, or take in oxygen through their gills while swimming underneath the water. External fertilization takes place outside the body of the female in most species of fish. Females release jelly-coated eggs in the water, and the males come along and release sperm to fertilize them. Fish also have well-developed circulatory, digestive, and nervous systems

Class Aves

Birds are characterized as warmblooded vertebrate animals that have wings and feathers. Warmbloodedness refers to the animal's ability to maintain a constant body temperature regardless of the temperature of its environment. There are twenty seven orders of birds. However they can be divided into four main groups: perching birds, flightless birds, birds of prey, and water birds. Within these four groups exist different orders.

Some examples of perching birds are robins, sparrows, cardinals, etc. . . These birds possess feet that allow them to easily grasp branches. Their beak is adapted for catching worms and insects, cracking seeds, and reaching deep inside flowers to collect nectar. Water birds such as flamingos have long legs and toes for wading. Ducks, and geese are the most familiar water birds, and they have paddlelike feet for swimming.

Ostriches, rheas, and penguins are a few examples of flightless birds. With the exception of the penguin, flightless birds have strong leg muscles that enables them to rapidly escape from their enemy. These birds have relatively small wing when considering their body sizes. However, birds of prey are excellent fliers with keen eyesight. While soaring high into the air, they can spot prey in the water or on the ground far below them. These birds have sharp toes called talons which enables them to grasp and hold their prey. They also possess sharp curved beaks which allow them to tear their prey into small pieces so that they can swallow their food. Birds of prey eat small animals like reptiles, mammals, fish and other birds. Some examples of birds of prey include eagles, owls and seagulls.

Class Mammalia

Mammals are characterized by specific features, even though other animals may possess some of the same features. Some of the characteristics include: (1) Mammals are vertebrate animals. (2) They are warmblooded animals. (3) They bear young which are nourished by milk. (4) Mammals have large brains which makes them quick learners. (5) They are partially covered with hair. (6) Their skin contain sweat glands. (7) Their hearts are made up of four chambers. (8) They possess a middle ear bone. (9) They hear extremely well because of their external ear (pinnae).

However, what makes mammals unique from other animals is that the female species possess mammary glands from which their name is derived. Mammary glands produce nutritious milk to feed their young. The sweat glands in their skin acts as a cooling mechanism during extremely high temperatures. The hair on mammals act as an insulator, or pelage which traps air and reduce heat loss from the body.

There are approximately nineteen living orders of mammals. The majority of mammals are viviparous (bear living young instead of laying eggs). The females' babies are nourished before birth through a placenta which attaches the embryo to the uterus of the mother. Mammals exist in every major habitat on earth, from the deepest oceans to the driest deserts, from the tropics to the polar region.

LESSON PLANS

LESSON PLAN I SETTING UP AN AQUARIUM

OBJECTIVE:

The student will observe and maintain an aquatic environment in the classroom.

MATERIALS NEEDED:

aquarium, gravel, metric ruler, dip net, thermometer, aquarium cover, aquarium light, water plant, snails, fish, fish food, aquarium filter

PROCEDURES:

- (1) Clean the aquarium with lukewarm water and place it on a flat surface away from direct sunlight. (Direct sunlight will cause an algae build up)
- (2) Rinse the gravel and use it to cover the bottom of the aquarium to a height of at least three centimeters.
- (3) Fill the aquarium about two-thirds full with tap water
- (4) Gently place water plants deep into the gravel making sure the roots are stationary.
- (5) Place the snails in the water.
- (6) Place the fish, along with the plastic bag in the aquarium for 15-25 minutes
- (7) Release the fish into the aquarium, and place the light hood on top of the aquarium.
- (8) Keep the temperature of the aquarium between twenty three and twenty seven degrees Celsius. Feed the fish a small amount of food each day.
- (9) Observe the aquarium every day for two to three weeks and record your observations in the journal.

OBSERVATIONS:

Have the students keep daily journal entries for two to three weeks.

LESSON PLAN 11: HOW DOES AN EARTHWORM RESPOND?

OBJECTIVES:

The students will observe earthworms.

MATERIALS NEEDED:

three earthworms, cotton swabs, cornmeal, plastic jar, soil, rubber band, foil, vinegar, water, dark construction paper

PROCEDURES:

- (1) Pick up one of the earthworms and a cotton swab. Touch the mouth end of earthworm with a cotton swab. Observe and record what happens.
- (2) Touch the center of the earthworm with the cotton swab. Record what happens.
- (3) Dip one of the cotton swab in vinegar. Bring the cotton swab close to the head, tail and center of the earthworm's body. (Do not actually touch the earthworm)
- (4) Record your observations.
- (5) Set up your jar as follows: Place about ten centimeters of soil into the bottom of a jar. Then add the remaining cotton balls.
- (6) Place the worms on top of the cotton balls. Place the foil on top of the jar. Let the jar set for ten minutes, and remove the foil. Record your observations.
- (7) Place the dark construction paper around the jar and let it set for one day.
- (8) Remove the construction paper. Record your results.

LESSON PLAN III: WHAT ARE SOME TRAITS OF ARTHROPODS?

MATERIALS NEEDED:

spider, pill bug, hand lens, petri dish or small jar, (use any other kind of bugs you can find)

PROCEDURES:

Caution: Handle live animals carefully.

- (1) Draw a chart with seven columns headed as follows: animal, exoskeleton, number of legs, number of body segments, jointed legs, antennas and wing.
- (2) Examine both sides of the insect in your petri dish Place your observations underneath each of the column listed above.
- (3) Draw a picture for each of the insects.
- (4) Repeat step 2 for each of the insects.

LESSON PLAN IV: ORAL PRESENTATION

OBJECTIVE:

Students in groups of four (you can determine the number of students in a group) will be assigned a phylum or class of animals at your discretion, and prepare an oral report before their classmates.

PROCEDURES:

- (1) Send one group of students to the library each day to find the necessary information about their particular group.
- (2) Have the students present an oral presentation at least ten minutes in length.
- (3) At the end of their presentations have the students turn in their notecards, along with a bibliography page of at least four or more different sources.
- (4) Instruct the students to make at least one visual project (poster, model, etc. . .).

BIBLIOGRAPHY PAGE

Booolootian, R., and D. Heyneman. *An Illustrated Laboratory Text In Zoology* , 2nd ed. New York: Holt, Rinehart and Winston, 1969.

Fauchald, J. Z. *The Polychaeta Worms. Definitions and Keys to Orders . Families and Genera.* Natural Museum of Los Angeles County, 1977.

Hickman, C. P. *Integrated Principles of zoology* , 4th ed. St. Louis: C. V. Mosby Co., 1970.

Oliver, J. A. *The Natural History of North American Amphibians and Reptiles* . New York: D. Van Nostrand Company, 1985.

Purdion, R. D. *The Biology of Mollusca* , 2nd ed., New York: Pergamon Press, 1987.

Romer, A. S. *The Vertebrate Body* . Philadelphia: W. B. Saunders Co., 1970.

Russell-Hunter, W. D. *A Biology of Lower Invertebrates* . London MacMillian Company, Ltd., 1983.

Storer, T. I., R. L. Usinger, and J. W. Nybakken. *Elements of Zoology* . New York: McGraw-Hill Book Company, 1980.

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