

Program 12 - HOW SCIENTISTS CLASSIFY ANIMALS - December 9, 1940SOMETHING TO DO AND TALK ABOUT FIRST

This lesson, so fundamental to biological sciences, is neither hard nor uninteresting. Children know that people are constantly putting together things that are alike. The broadcast will show this, and it would be a good idea for you to discuss it with the children beforehand. Ask them if they have noticed how their mothers keep all the cups in one place in the cupboard, and all the plates in another. Mention the storekeeper, who keeps his threads on one shelf, and his silk dress goods on another. Show them that gardeners classify plants as biennials, perennials, annuals; or as early-flowering, and late-flowering. We classify things because it is the best way we know to keep them in order.

There are at least a million different kinds of plants and animals on this earth. Can you imagine the mixups that would result if we didn't have some scheme for putting plants and animals into groups that are alike in certain ways, and giving each group a name?

Ask the children this question: If you didn't know the names of animals could you talk about them very easily? Names are part of classifications.

One pupil might read about Carl Linnaeus and Pehr (Peter) Artedi, and report their ambitions and efforts to classify and name every living thing in the world.

DO YOU KNOW THESE WORDS?

vertebrates      invertebrates      mammals      reptiles      amphibians

LISTEN FOR THESE IDEAS

1. In classifying animals what characteristic did scientists use:  
(a) appearance?      (b) habitat?      (c) structure?
2. Into what two main groups are all animals divided?  
Into what five classes are all vertebrates divided?  
Name four different kinds of animals that belong in each class.  
Why is a whale not a fish? A bat not a bird?  
Which are most plentiful, animals with, or animals without backbones?  
Name a few common examples of animals without backbones?

SOMETHING TO DO AND TALK ABOUT LATER

1. Why aren't birds and butterflies grouped together?
2. Would you put angle worms and snakes in the same group?
3. If you're in one of the upper grades, look up the meanings of some of these names of invertebrates:  
(1) Protozoa      (2) Porifera (sponges)      (3) Coelenterates (corals)  
(4) Echinoderms (starfish)      (5) Annelida (earthworms)      (6) Mollusks  
(7) Arthropods (insects and spiders)
4. Why did scientists use Greek and Latin names for classifications?

### HOW SCIENTISTS CLASSIFY ANIMALS

Hello Boys and Girls:

A little over two centuries ago, two earnest young men were attending a university in Sweden; these men left their mark in the world. They became very close friends, because they were interested in about the same things. These young men were Carl Linnaeus and Peter Artedi. <sup>with it</sup> Carl had come to study medicine and Peter was studying to be a minister. But they had a common interest; that is why they were life-long friends. Peter was interested in chemistry and fishes, and Carl was interested in birds and flowers. While on one of their many long walks, they got to discussing the names of the living things of this earth. They found that they did not know very much about the world they lived in; that there were plants and animals right in their neighborhood that they couldn't name, and no one else seemed to know what they were. They knew that men had been working for over 2000 years to find a plan for naming and grouping living things, but the plans ~~that~~ arrived at didn't work out very well. Names didn't mean a thing. It was just like so many of our common names. We talk about a gopher here, but down in Florida, it is a name given to the land turtle. We talk about the flicker here, and people in another part of the country might not know what we are talking about, for there the bird is called the golden-winged woodpecker. We talk about the ragweed here, and in another part of the country it is called the hogweed.

So one day, probably while out on a hike, these two courageous young students got a great idea. The idea was so great that neither they nor any other two men could have carried it out in a life time. They decided to name and classify every living thing in this world. Only the young would have the courage to tackle such a tremendous task. But they did, and then and there they divided up the world of things between them. Carl was to take the birds and flowers and minerals, and Peter was to take the fishes and amphibians and insects.

Well, these two courageous friends studied and worked and named many thousands of plants and animals. But they were just getting a start when death took them away. But they did something that lives on to this day - they worked out a plan for naming and clasifying all living things, and they invented a name-language, so that today a <sup>scientist</sup> ~~man~~ in India can write to a scientist in United States about a plant or animal, and each will know what the other is talking about. So they invented a name - language that is used by scientists all over the world, and that name-language was based on the Latin language.

Now, let's see what the plan was that Carl Linnaeus and Peter Artedi used 200 years ago. It will be necessary for you to use your pencil and paper, for Ranger Mac wants you to write down the names of a few animals. We will select, first of all, the names of a few animals that are familiar to you. You are not accustomed to calling a butterfly an animal, or a frog, or a toad, or a fish, or a bird - but they are animals - all of them. An angleworm is an animal. When we think about animals, our minds run to bears, fox, deer, skunks and the like. But we must change our thinking about this, for every living thing that is not a plant, is an animal. Some animals are so small that it takes a high powered microscope to see them at all, and one is so large that Jonah could live in its stomach. Now if you are ready with pencil and paper, write down on the left side of the page these names: dog, butterfly, snake, frog, fish, bird, turtle, snail, angleworm, man. I guess that is enough. You know how each one of these animals looks, so that you could tell which one is which without any trouble. You would tell by appearances, but the scientist groups animals by their structure - how the animals are constructed. All animals of the world are divided into two groups according to structure - some have a backbone, and some do not. Let's look down our list and find out which ones have backbones and which do not. Then we will have divided them into two groups just as the scientist does. The dog has a backbone so put a dash after dog. The butterfly does not so put a cross after butterfly. The snake has a backbone, so put a dash there; so has

the frog, fish, bird, turtle, and man. So each of these has a dash after the name. But the snail and angleworm do not, so put a cross after each one. Now we have done just what we started out to do. We have divided animals into two groups, one with backbones and one without. The animals with backbones are called vertebrates; the ones without backbones are called invertebrates. Vertebrates and invertebrates - two big words; Latin name-words which divide the animals of the world into two groups; those with and those without notched-bones which run along the back - those with vertebrae and those without vertebrae. You will find these two big words spelled out in your manual; so Renger Mac will not take the time to spell them out.

But we should know these two big words, because all the animals of all the world fall into one or the other of these two groups.

Let's take a hasty look at these two groups before we start dividing them into smaller groups. Which one of these two groups do you think is the larger in number? There are far more invertebrates than vertebrates. If you were to draw a circle and have the area of the circle represent all the animals of the world, then divide the area into vertebrates and invertebrates, you would have just a small segment representing the vertebrates. Only 5% of the animals of the world are vertebrates. Take the insects alone - an insect is an invertebrate, remember, - there are 700,000 different kinds that have been named, and insect scientists say they believe there are four times as many that have not been discovered and named. Under the bark of a single shagbark hickory there are more insects than people in your entire township. There are more different kinds of spiders alone than there are <sup>different</sup> mammals in the world. Probably there are more angleworms in my little garden than people in the whole of Dane county. So you see there are far more different kinds of animals without backbones than those with backbones.

Well, let's see how far we have gone. We have divided the animals of the world into two groups - vertebrates and invertebrates. But this does not tell us how to tell a ~~dog~~ from a ~~cat~~; or a bird from a bat; or a whale

from a fish. We must divide this large group into smaller groups. Let's see how the learned men did this. They took all the animals that were alike in certain ways and yet were different from other animals in certain ways, and put them in groups. If we do this we find that all the animals with backbones can be divided into five groups. Ranger Mac wants you to write them on your paper. Here they are: FISHES; REPTILES; AMPHIBIANS; BIRDS; and MAMMALS. Let's see what makes a fish a fish and not a reptile. A fish, as you know lives in the water, and its body is so built that it can move about easily in the water. So does a whale, you say. Well, let's see. A fish to be a fish must get its oxygen from the water, that is, it must be able to breathe in the water; and this it does by having the water pass over the gills. The blood ~~gills~~ in the gills takes the oxygen from the water and gives off the carbon dioxide to the water. But a whale has lungs and must come to the surface in order to breathe. So you can see why a whale or a muskrat or a snake is not a fish. So fish make one division of the vertebrates.

Now, let's take the amphibians. Frogs and toads are amphibians. All amphibians hatch from eggs and become tadpoles. When tadpoles, they look and act like fish, and breathe by means of gills just as fish do. But soon they lose their tails, <sup>gills</sup> ~~and~~ develop legs and lungs, and then they come out on the land. So you can see why a fish is not an amphibian, or a frog is not a fish. So this is another group of vertebrates, and to it belong frogs, toads, tree-toads, salamanders and mud-puppies. The word amphibian means "of both kinds" and these animals are water animals for a time, then land animals - both kinds. We have airplanes called amphibian planes, meaning they can light on land or on water.

Now, let's take another group - the reptiles, Snakes, turtles, crocodiles, alligators, and lizards are reptiles. All of them have bony plates protecting their bodies which develop from the skin, in somewhat the same way our finger nails do. When they are born, they are born just as they will always be - they do not make any changes like the frogs and toads do. And they have lungs. So you can see why a snake or a turtle cannot be placed in the same group as a fish or an amphibian.

Now, let's take the fourth group - the birds. Birds are the only animals covered with feathers, they breathe with lungs, and unlike fish, amphibians and reptiles, they have a high body temperature. Like us, they are warm-blooded, but their temperature is much higher than ours. Ours is 98.6 degrees while a birds may be as high as 110, in some kinds of birds. So you can see why birds make a group by themselves, and cannot belong to any of the other groups.

Now, the fifth and last group or class of vertebrates is the mammals. Whales, bats, seals, elephants, tigers, monkeys, cows, squirrels, rats, and man belong to this group - the mammals. Mammals have three main differences in their structure from all the animals in the other groups. First; they have milk glands to feed their young. The word mammal comes from mammary glands. So does mamma. Second: They have hair, either all over the body, or on some part of the body. Third: The interior of the body is divided into two parts by a diaphragm, one part containing the heart and lungs, and the other part the stomach and intestines. So now you can see why a whale is not a fish and a bat not a bird because they have all the three things mentioned above.

So this is the way the learned men, called scientists, divided the animals with backbones - the vertebrates. ~~And~~ They did the same with the invertebrates - the spineless animals. But that was a more difficult job because there are more of them, and they are smaller, and it was not so easy to separate them into groups.

If we had time we could go on and divide each of these groups into other groups; then those into others, until we finally got to the name of each kind of fish, or bird, or snake, or frog, or mammal. But we cannot do that in the short time that we are allowed away from our classroom work, ~~and~~ all that Ranger Mac wanted to show you is the way scientists have grouped the animals of the world, by their structures.

So, "the world is so full of a number of things, I'm sure we should all be as happy as kings". But there are few kings these days, and those that live are not happy. But the rose is still fragrant and the songs of the phoebes is not less lovely than when Carl and Peter did their great work. The small things of nature are still here just as they have been for centuries, and their magic is not gone. If man is unhappy, it must be his own fault.

Good Bye, and

May the Great Spirit  
Put Sunshine into your Heart  
Today, and forevermore,  
HEAP MUCH!