**THE SCIENCE OF TAXONOMY**

**Learning aims:**

* To identify living organisms in the local ecosystem
* To develop observation and interpretation skills
* To construct keys using common features of organisms
* To inquire about scientific classification –taxonomy- of organisms
* To inquire about the life cycle of a living organism
* To inquire about the role of an organism in the ecosystem
* To use genetics to identify common features of organisms
* To discuss the theory of evolution based on DNA homologies

**Materials:**

**In the field**

Beating Stick and Net

Aspirator

Killing Tube

Light Trap

Keys

Camera

Container

**In the lab**

Dissecting Microscope

Compound Microscope

Scanning Electron Microscope

DNA Sequencing homologies

The [biodiversity](http://en.wikipedia.org/wiki/Biodiversity) of planet Earth is the total variability of life forms. Currently about 1.9 million species are known, but this is thought to be a significant underestimate of the total number of species. Every year, thousands of new species are discovered. Biologists use characteristics of each newly discovered species to classify organisms having similar characteristics. A classification system is used to assign a single universal name to each organism. Biologists in the field have to use their observation and interpretation skills to make deductions about the organisms they discover. This lets them build up an accurate picture of the role of the organism in its environment, how they interact with their surroundings and what threats they may face now or in the future.

***Exercise 1***

* Observe with your team the environment. Use a field notebook to sketch the organisms that you discover, and take notes on their features including shape, coloring, and behavior. Write down when and where they found the organism, and any interesting information about its behavior. You must be as precise as possible. If you can, use a field guide or a specialist (e.g., botanist, forester, zoologist) to identify what kind of organisms they have found. keep track of any questions that occur to you.
* Discuss with the team why the organism must be kept alive. If they capture a live insect, and they want to observe it for a short while before setting it free, they must put it in a clear container with enough room for it to fly around and to breathe.
* Return the organism to its natural habitat.
* Take a photograph of any interesting organism and start a photo album.
* Without the right tools, insects can be tricky to catch. Search the network for homemade bug-catching devices they can make by themselves.
* Use a stereoscope or a microscope in the laboratory to identify any relevant characteristics.
* Record the characteristics of the organism.

**Questions:**

1. Classify the organism you have discovered into one of the five kingdoms listed below:

|  |  |
| --- | --- |
| Prokaryotes | Small, simple, single cell, nucleus has no membrane. |
| Protoctista | Large single cell, nucleus is enclosed by a membrane. |
| Fungi | Multicellular, thread-like with specialized cells. |
| Plants | Multicellular, have specialized cells, do not have means of locomotion. |
| Animals | Multicellular, have specialized cells, have their own means of locomotion. |

2. Can you suggest what the organism under investigation eats, or how it gets its food?

3. Describe the habitat that the organism occupies.

4. Is it likely to be active at night or during the day?

5. a) Write the taxonomy of the species that you have discovered:

Kingdom / phyla / class/order/ family/ genus/ species

b) Its scientific name is ……………………………………………

c) Its common name is …………………………………………….

d) Who proposed a new system of classification?

***Exercise 2***

Construct a dichotomous key to identify a specific plant species in the ecosystem of investigation

***Exercise 3***

Inquire in the website for information about the role of the organism they have identified in the ecosystem.

* Gather responses and subsequent questions from students with little comment or direction.
* Allow students to collaborate in their team
* Student teams gather data.
* Re-evaluate question based on new data from all the teams
* Students present findings as an oral presentation, a poster presentation or an evaluative write-up.

**Questions**

1. The space where an organism lives and the role an organism plays within its ecosystem is referred to as a:
   1. sampling
   2. population
   3. niche
   4. biome
2. An organism that creates its own food is called:
   1. a producer
   2. a consumer
   3. a scavenger
   4. a decomposer
3. A consumer is:
4. an organism that produces its own food
5. an organism that does not need food to survive
6. an abiotic organism
7. an organism that cannot produce its own food
8. Herbivores, carnivores and omnivores are:
9. plants, animals and micro-organisms
10. three types of consumers
11. three types of producers
12. three of British Columbia's 10 eco-provinces
13. An organism that eats decaying plants and animals is called :
14. a decomposer
15. a parasite
16. a carnivore
17. a scavenger
18. Parasitism, commensalism and mutualism are
19. three examples of producers
20. the three main types of symbiotic relationships
21. the three main types of ecological relationships
22. three examples of abiotic interactions
23. Which of the following is a symbiotic relationship where one partner benefits and the other does not benefit or lose from the relationship?
24. commensalism
25. mutalism
26. parasitism
27. decomposition
28. Which of the following is a symbiotic relationship where both partners benefit?
29. mutualism
30. parasitism
31. commensalism
32. symbolism
33. Which of the following is a symbiotic relationship where one partner benefits and the other is harmed?
34. commensalism
35. mutualism
36. symbolism
37. parasitism

***Study visit***

Genetics as well as simple observations are used in classification today. Visit a genetic institute to investigate how DNA analysis can provide evidence in a taxonomic study.

**Introduction:** In modern biology, it is not considered satisfactory to consider adaptations, evolution, speciation and physiology as autonomous topics, but an appreciation of other disciplines, such as biochemistry, is essential. The study of molecular evolution by comparing protein and gene sequences can integrate biology with chemistry and Physics.

***Discuss the theory of evolution based on DNA homologies***