

**GOAL:**

To appreciate the diversity of living things in Manitoba.

**\*Please share this kit with other teachers that are coming to FWA with your group.**

**OBJECTIVES:**

Students should be able to:

1. Define biodiversity and the five kingdoms of living things.
2. Develop a simple classification system with groups and subgroups.
3. Use a provided classification key to identify living things.
4. Compare and contrast adaptations of invertebrates.
5. Appreciate that biodiversity is important to humans and the environment.

**VOCABULARY:**

(Bio)diversity, classification, classification key, 5 kingdoms (Bacteria, Protists, Fungi, Plants, Animals), adaptation, habitat, vertebrate, invertebrate

**PRE-VISIT ACTIVITIES:**

- 1) During the World of Difference field trip, your students will be visiting forest, grassland, and marsh habitats. Have your students complete a research project or picture book of the vertebrate animals that can be found in one of these habitats.
- 2) Introducing the basic types of plants will help your students during their plant explorations at FortWhyte. Help students to distinguish between flowering and non-flowering (ferns, mosses), and between herbs, shrubs and trees. It may help to print pictures of these different plant types and have students glue them into categories on large poster paper. This project can be put on display around the classroom.
- 3) During the field trip, students will be netting and identifying insects and spiders. Many students may already have a fascination with small invertebrates such as these. There are many great resources that will help you introduce your class to these critters before the field trip. Videos you may enjoy include:
  - a. "Life in the Undergrowth (2006)," narrated by David Attenborough. Available from Amazon and Winnipeg Libraries.
  - b. "Microcosmos (2005)," visual with no narration. Available from Amazon.
  - c. Short video clips online at National Geographic Kids.

You can also contact the Department of Entomology at the University of Manitoba for a free in-class presentation of live and pinned insects or a tour of the Department (phone 474-9257).

## **POST-VISIT ACTIVITIES:**

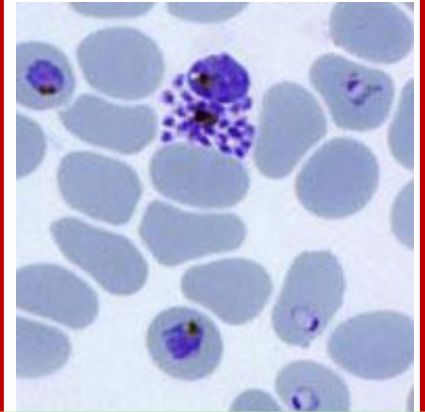
- 1) Using the information the students gathered from the field trip and curriculum, create a game of “Jeopardy” or “Who Wants to Be a Millionaire?” You may choose to make up questions for the game yourself, or divide the class into two groups so one half of the class can develop questions to test their peers in the opposing half, and vice versa.
- 2) On your field trip, take the opportunity to collect a sample of water to bring back to school. Keep it out of direct sunlight, until arrival back at school. Look at the sample under microscopes to find members of Kingdom Protista that live in pond water. Use our pre-developed Protista and Monera Trading Cards (see below) to introduce students to single-celled organisms. They can be used as rewards for a game, or students can develop their own game using the cards. Students may develop their own trading cards, using the blank template provided. You may find this site useful:  
<http://www.microscopy-uk.org.uk/mag/art97b/printro.htm>
- 3) To investigate more members of the Kingdom Fungi, start a Mold Ranch in your classroom.
  - a. Have students decide on different foods that may grow mold.
  - b. Place different foods in labeled airtight jars or on paper plates in Ziploc bags. Place a damp paper towel with the food for added mold growth.
  - c. Observe the results!  
A more detailed science experiment about molds can be found at this site:  
<http://www.infoplease.com/cig/science-fair-projects/foods-do-molds-love-best.html>.



***Paramecium***  
**Kingdom Protista**



***Euglena***  
**Kingdom Protista**



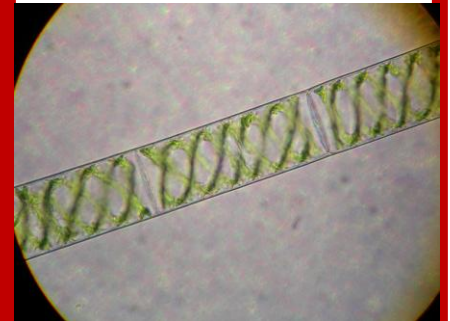
***Plasmodium* aka Malaria**  
**Kingdom Protista**



***Amoeba***  
**Kingdom Protista**



***Giardia* aka Beaver Fever**  
**Kingdom Protista**



***Spirogyra***  
**Kingdom Protista**

### **Paramecium**

**Habits:** free-living

**Habitat:** ponds with scum on them

**Energy Source:** eats algae and bacteria

**Reproduction:** fission, (splits in two) and occasionally conjugation, (two of them exchange some of their DNA)

**Interesting facts:** The tiny hairs (cilia) around the cell helps it to move.

### **Euglena**

**Habits:** free-living

**Habitat:** ponds

**Energy Source:** eats algae, and can also make its own food with chloroplasts

**Reproduction:** fission (splits in two)

**Interesting facts:** Euglena has chlorophyll in it, allowing it to make its own food in sunlight. When Euglena is in the dark it eats plants.

### **Plasmodium vivax**

**Habits:** parasite of humans

**Habitat:** mosquito gut and human blood, liver

**Energy Source:** human red blood cells

**Reproduction:** conjugation (exchange DNA) in mosquito's stomach

**Interesting facts:** Plasmodium are carried by mosquito from host to host. It causes a serious disease known as malaria.

### **Amoeba**

**Habits:** free-living

**Habitat:** ponds and rivers, leaves of water plants

**Energy Source:** eats algae, protists, bacteria

**Reproduction:** fission (splits into two cells)

**Interesting facts:** The amoeba consumes other organisms by flowing its body around them.

### **Giardia**

**Habits:** parasite of animals (including humans)

**Habitat:** freshwater and the animal or human digestive tract

**Energy Source:** absorbs nutrients from intestine

**Reproduction:** in the intestine, usually through fission (splitting into two cells)

**Interesting facts:** Giardia is also called "beaver fever." The parasite causes bad diarrhea.

### **Spirogyra**

**Habits:** free-living

**Habitat:** freshwater ponds, lakes, ditches

**Energy Source:** sunlight and nutrients

**Reproduction:** conjugation (two of them exchange some DNA)

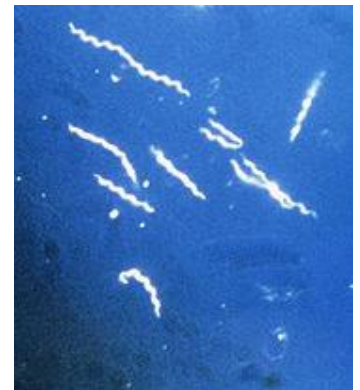
**Interesting facts:** Grows in slippery thread-like filaments. It's called "Spirogyra" because green chloroplasts, form a spiral pattern inside its cells.



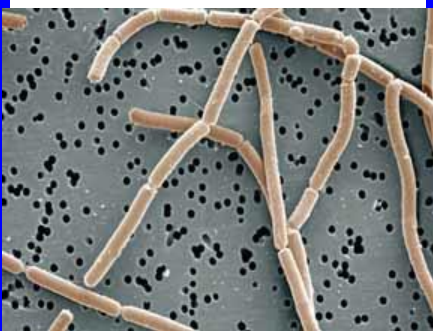
**Kingdom: Monera - Bacteria**  
***Clostridium botulinum***



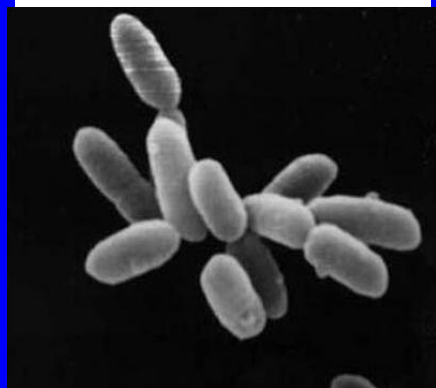
**Kingdom: Monera - Bacteria**  
***Anabaena* - Blue-Green Algae**



**Kingdom: Monera- Bacteria**  
***Borrelia burgdorferi***



**Kingdom: Monera -Bacteria**  
***Lactobacillus delbrueckii***



**Kingdom: Monera -Archaea**  
**Archaea**



**Kingdom: Monera- Bacteria**  
***Yersinia pestis***

### ***Clostridium botulinum***

**Habits:** free-living, sometimes toxic to animals

**Habitat:** found in soil, contaminated food.

**Energy source:** nutrients

**Reproduction:** binary fission, and form resilient spores

**Interesting facts:** These bacteria live without oxygen. They can produce nerve toxins that cause "botulism." Botulism in humans is usually caused eating contaminated food. "Botox" anti-wrinkle treatments use the toxins.

### ***Anabaena***

#### ***Blue-green algae***

**Habits:** free-living, sometimes toxic to animals

**Habitat:** lakes with high levels of nutrients

**Energy Source:** sunlight

**Reproduction:** binary fission, and form resting cells that can survive many years

**Interesting facts:** Certain *Anabaena* produce a nerve toxin that can poison land animals, and is not easily eaten by animals in the water. *Anabaena* can form huge algal blooms that turn lakes green and choke lake life.

### ***Borrelia burgdorferi***

**Habits:** a disease-causing pathogen

**Habitat:** deer ticks, blood and tissues of mammals (including humans)

**Energy Source:** nutrients

**Reproduction:** binary fission

**Interesting facts:** The bacteria can be given to mammals through the bite of a deer tick, and causes a disease called Lyme Disease. The bacteria move through the bloodstream by twisting along like corkscrews.

### ***Lactobacillus d. bulgaricus***

**Habits:** free-living

**Habitat:** A warm lactose-based environment such as milk

**Energy source:** Lactose sugar

**Reproduction:** binary fission

**Interesting facts:** This bacterium is used in yogurt culture because it turns sweet-tasting lactose sugar into sour-tasting chemicals like lactic acid. Doctors say that eating yogurt with these bacteria in it improves the health of our digestive system.

### ***Archaea***

**Habits:** free-living

**Habitat:** most live in extreme environments: mineral-rich and above boiling point

**Energy source:** different  
Archaea use carbon dioxide, nitrogen gas, or hydrogen sulfide gas

**Reproduction:** binary fission

**Interesting facts:** some can live deep underground in under high pressure above 200 atmospheres. Archaea are very different from other single-celled creatures and are likely the oldest life-form on Earth.

### ***Yersinia pestis***

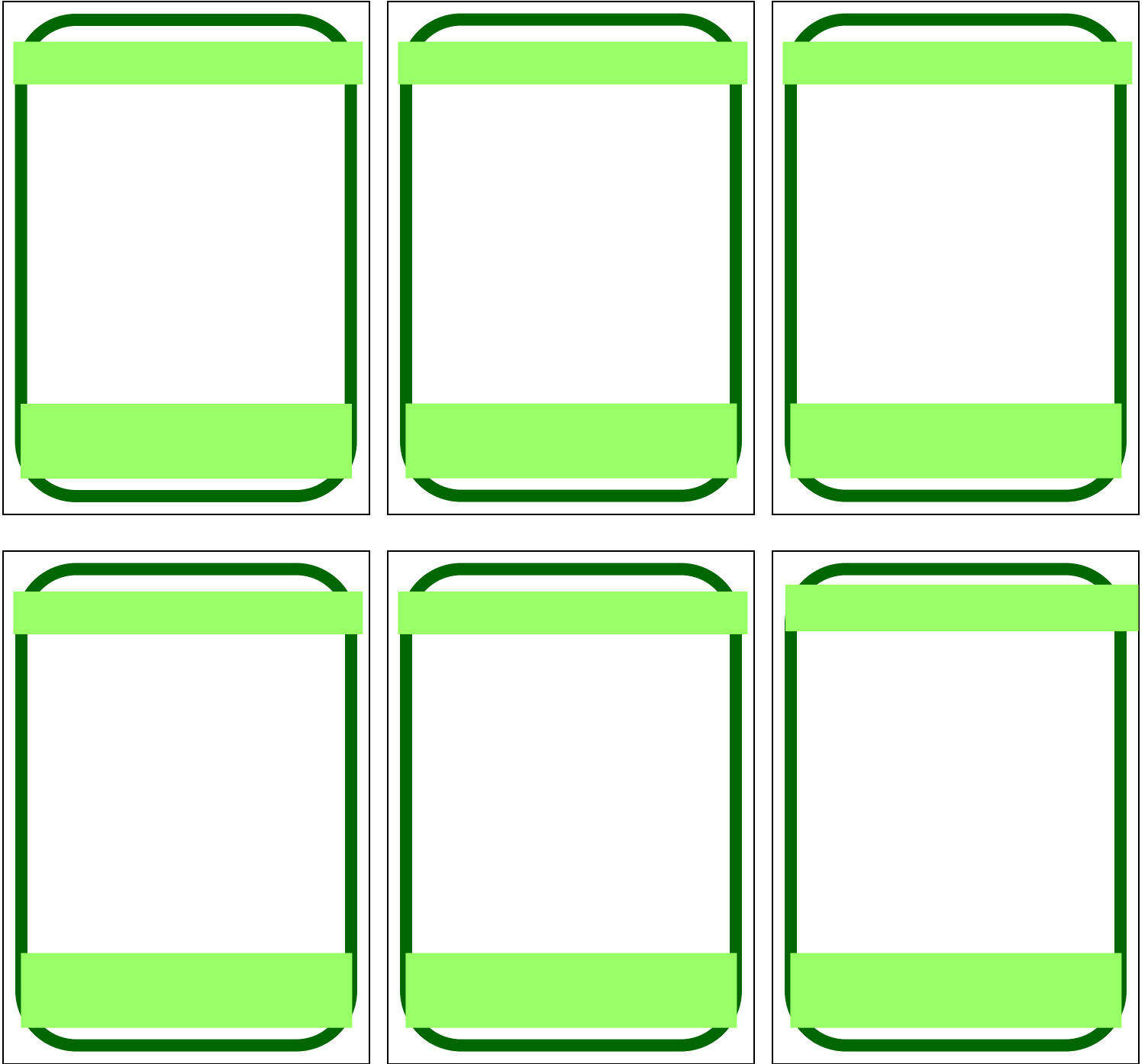
**Habits:** a disease-causing pathogen

**Habitat:** fleas, rodents, and humans are hosts.

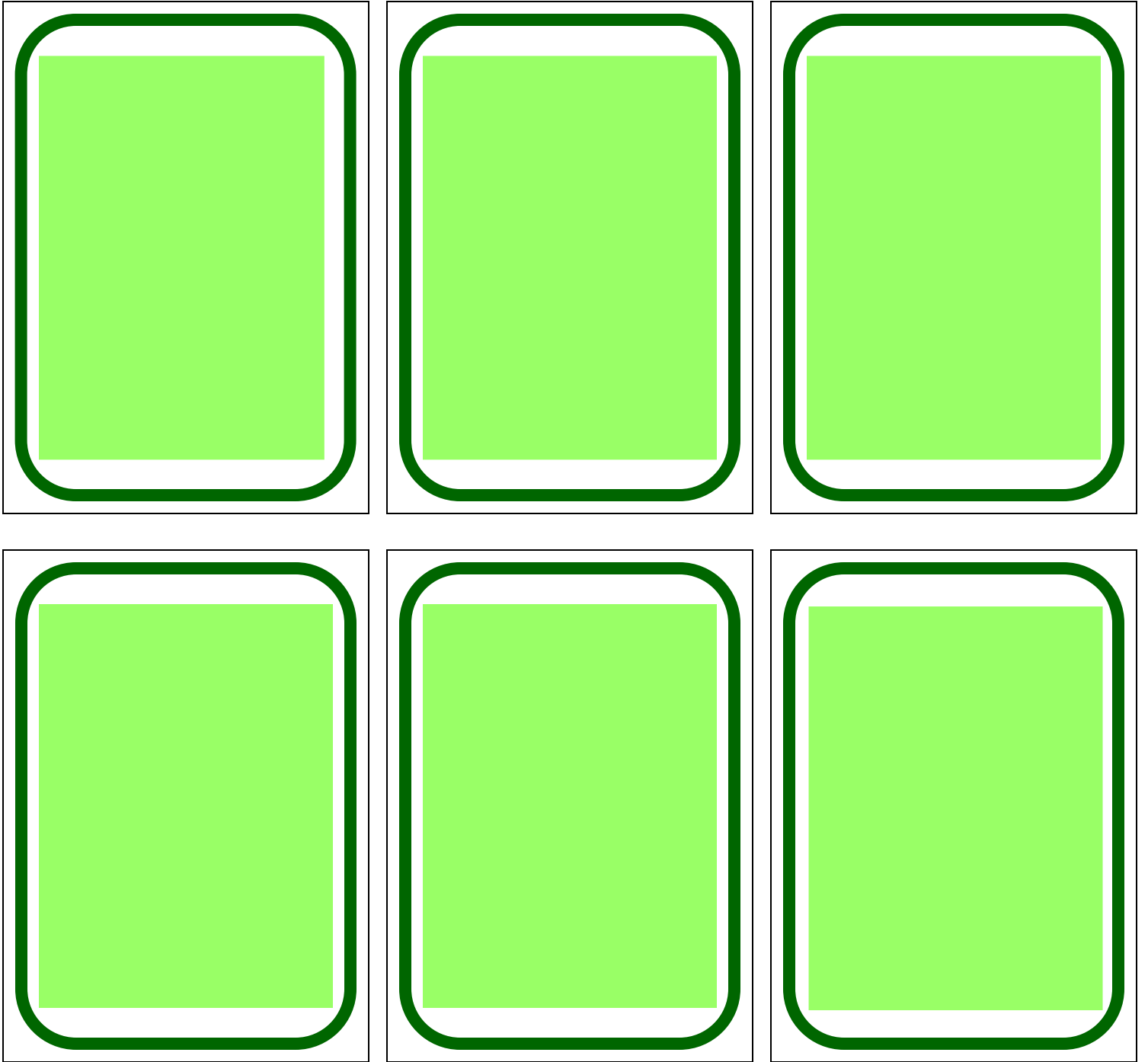
**Energy source:** nutrients

**Reproduction:** binary fission

**Interesting facts:** The Black Death in the Middle Ages was caused by these bacteria. The disease is also called "the plague." The bacteria can avoid and destroy white blood cells, and reproduce in huge numbers, causing death within a week. Luckily, today there are lots of medications to cure plague.



TRADING CARD TEMPLATE PAGE 1



TRADING CARD TEMPLATE PAGE 2