Biomagnification Simulation

**Background:**

Many forms of pollution can threaten **biodiversity**, but one of the most serious problems

occurs when **toxic** compounds **accumulate** in the **tissues** of **organisms**. This

phenomenon is referred to as **bioaccumulation**.

When **heavy metals**, such as **mercury** and **lead**, and certain synthetic compounds like

**pesticides** and **herbicides** are **absorbed** in the **body** along with food and water, they

dissolve in the lipids of the organism and are **not removed by excretion**. Every time an

organism eats a **contaminated food**, small amounts of the toxin are absorbed and

**retained in the body**. Small amounts of toxins are consumed over time and they gradually

**accumulate** which causes **toxic effects** on the body. **Biomagnification** occurs as these

effects are compounded throughout a **food chain**.

**Objective:**In this activity, you will simulate the **biomagnification** of a chemical throughout an ecosystem. You will then determine which organisms are most affected by the chemical.

**Part 1 – Biomagnification of DDT**

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| * 1 bag with Skittles or other candy | population of primary producers (contaminated with **DDT**)  Ex: Grain, Corn, Soy Beans, etc |
| * 8 Small clear plastic cups | Insect |
| * 4 Small blue paper cups | Spider |
| * 2 medium clear plastic cups | Sparrow |
| * 1 Large cup | Sparrow Hawk |

**SET UP:**

* ****The **Skittles** in the plastic bag represent the **producer population**. Each skittle is one contaminated producer.
* **First row:** Line up 8 small clear cups

Don’t eat the skittles!

* **Second row:** Line up 4 small blue paper cups
* **Third row:** Line up 2 medium clear plastic cups
* **Fourth row:** Line up 1 large cup

**PROCEDURE**

1. Now, simulate **Insects eating** some of the **producers**. Remove **3 skittles** from the plastic bag and place them into one of the **small cups**.
2. Repeat **step 1** for the remaining **seven** small cups. *In your data table record the amount of DDT in each insect.*
3. Now, simulate the **spider** eating **insects**. Each spider needs to eat **2 insects**. Empty the contents of **2 small cups** into one of the **blue paper cups**. Repeat for the remaining blue cups. *In your data table record the amount of DDT in each spider.*
4. Simulate **a sparrow** eating spiders. One sparrow needs to consume 2 spiders. Empty the contents of the 2 blue paper cups into the medium plastic cup. Repeat this step for the other birds as well. *In your data table record the amount of DDT in the sparrow.*
5. Finally, simulate a sparrow hawk eating a sparrow. One sparrow hawk needs to consume 2 sparrows. Empty the contents of the 2 medium clear cups into the large cup*. In your data table record the amount of DDT in the Fox.*

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**DATA TABLE**

Sparrow

**Record amount of skittles per organism.**

|  |  |
| --- | --- |
| AMOUNT OF MERCURY PER ORGANISM | |
| ORGANISM | **AMOUNT OF SKITTLES** |
| Insect |  |
| Spider |  |
| Sparrow |  |
| Sparrow Hawk |  |

Sparrow Hawk

**Analysis Questions**

1. **Draw a food chain showing all of the organisms represented in part 1 of this activity.** 
   1. Include consumer level
   2. Trophic level (*this is review from Unit A: Interactions & Ecosystems)*

Biomagnification Simulation

1. What happened to the amount of DDT per organism as you move up the food chain?

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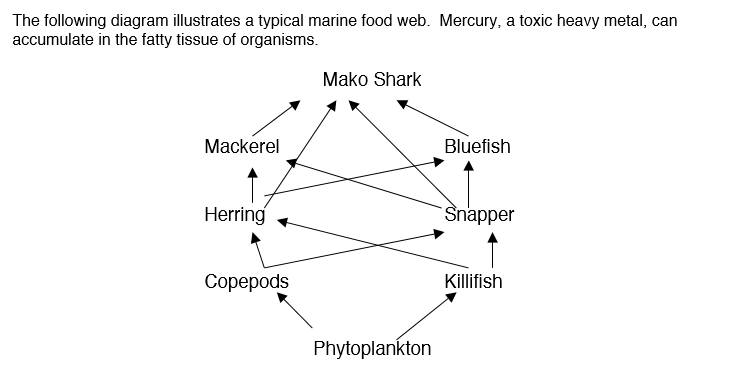
1. Which organism contained the largest concentration of DDT? Explain your reasoning. Consider other food this organism ate and what you can assume about DDT concentration.

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1. Explain in your own words (using the simulation) biomagnification.

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Biomagnification Simulation



1. Which organism would you predict to have the highest level of mercury? Explain your answer.

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1. Of the following types of fish, which would be the safest to eat? Explain your answer.

Mackerel Snapper Mako Shark Bluefish

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