

Tyler Schmalenbach

Assignment: Biomagnification and Food Chains

The first set of questions is based on the article: Mercury-Laden Fog May Be Poisoning California's Mountain Lions

1. Where does mercury pollution come from in the Pacific Ocean off the CA coast? How does this biologically inactive mercury convert to the dangerous form, methylmercury?

Mercury enters the atmosphere through human activities, such as mining and power plants. The mercury in the air rains into the ocean, where it is converted into methylmercury by bacteria. It then enters the atmosphere again through the fog and makes its way along the coast and inland where it collects on and enters lichen.

2. According to the article, what health effects does mercury have on mammals like mountain lions?

At high concentrations, methylmercury can cause neurological and reproductive damage.

3. Create (draw by hand or use your computer keys to create arrows) to show the food chain described in this article. Be specific about what the primary producer discussed in this article is. Label each level of the food chain with BOTH the organism described by the article *and* the name of that level of the food chain.

Puma (secondary consumer)

^

Deer (primary consumer)

^

Lichen (primary producer)

4. According to the article, how much can mercury concentrations increase in this system from the primary producer to the mountain lions?

Mercury concentrations can increase by 1000 times.

5. Explain what bioaccumulation is. How does biomagnification work and how does it differ from bioaccumulation?

Bioaccumulation is the collection of substances in organisms over time. Biomagnification on the other hand, is the increase of concentration of certain substances in organisms up the food chain. This is because animals that are higher on the food chain eat organisms that have accumulated substances lower on the food chain. The higher up the food chain an organism

is, the more of that substance accumulates. The lower an organism is on the food chain, the less concentrated that substance is.

The second set of questions is based on the article: **Killer Whales Are Most Toxic Arctic Animals**

- 1. What chemicals did the researchers look for in the orcas? Where do these chemicals originate and how do they get to the Arctic?**

The chemicals found in the orcas are manufactured chemicals such as polychlorinated biphenyls, pesticides, and brominated flame-retardants. These chemicals come from consumer products that humans use everyday. They enter the arctic because of air and ocean currents that move mostly northward. In the colder environments, these chemicals take longer to break down.

- 2. How was the data collected (how did they get samples from the orcas)?**

Blubber was sampled from the orcas in Norway. The whales were shot with a gun that removes a sample of blubber that allows them to test the toxins.

- 3. What are the two most toxic animals in the Arctic?**

The two most toxic animals of the arctic are killer whales and polar bears. They are each at the top of their respective food chains.

- 4. Explain why toxin levels in these two species, in particular, are higher than in other Arctic species.**

The toxins are highest in these species because they are at the top of their respective food chains – biomagnification. Another reason concentrations are highest is because these animals are rich with body fat, which toxins bond themselves to. They also eat fatty animals such as walruses and sea lions.

- 5. How can these toxins transfer from one generation to the next in marine mammals?**

These toxins transfer from one generation to the other easily – not only are toxins transferred during pregnancy, but orcas have milk that has high concentrations of fat that ends up going to their offspring.

- 6. What kinds of effects do these toxins have on these animals?**

The toxins affect the reproduction system, affecting pregnancy and the survival of calves. They also affect the hormonal system, causing problems in metabolism and the immune system.