

Life as a Fish

Meet Mollie. She's a young mummichog living in the Elizabeth River like her mother, her grandmother, her great-grandmother, and her great-great-grandmother.



When Mollie's great-grandmother was young and living in the Elizabeth River, there was less pollution, which means Great-Grandmama Chog enjoyed a clean river. Her *habitat* was an unpolluted river. But, the river has changed, and Mollie and her family are *adapted* to her changed environment so that she can survive in the polluted river.

How is Mollie adapted to her environment? Well, when her grandmother was young, people built a factory nearby, and the factory released some chemicals into the river. These chemicals can give fish and people heart problems, cancer, and other diseases. Can you guess what happened? Many fish had unhealthy hearts and eventually died. But some of them, like Mollie's grandmother, were different from the other fish. Their bodies were able to defend themselves against the chemicals. Even though these fish got sick, they were able to keep living and have children. Mollie's grandmother passed this ability to her baby – Mollie's mother, Mama Chog! Now, Mollie and all of the other young mummichogs living in the Elizabeth River are able to live in the polluted river. That's good news! *Adaptations* are changes or differences that help an organism survive and are passed on from one generation to the next. These mummichogs have adapted to the new habitat in the river; these types of adaptations are called *physiological adaptations* because their bodies are physically changing. *Behavioral adaptations* are changes in behavior that help an organism survive – like the type of food it eats, how it finds food, or where it lives.

But there's some bad news to this story, too. The fish have to put a lot of energy into protecting their hearts from the chemicals. Fish get energy from the food they eat – just like us! If fish need to use energy to protect their hearts from the chemicals they won't have as much energy to do other important things. Now, even though Mollie has a healthy heart, she can't swim as fast or for as long as the fish that didn't have the adaptations– she gets tired really quickly! There is a cost to protecting Mollie's body from the chemicals, but the danger from the chemicals is so great that surviving the pollution is more important. Scientists call this trade-off a *fitness cost*, or trading one ability for another that impacts the probability of successfully reproducing that allows the living thing to survive and reproduce. Mollie doesn't get very sick, but the cost was losing the ability to swim well.

Questions on back

Short answer

1. Think about Mollie's story and how she is adapted to her environment. What are some ways you are adapted to live in your environment? They can be physical or behavioral adaptations.
2. Think about how the adaptations that make it harder to get sick, were passed on from parent to child. What do you think Mollie's child will be like?
3. Think about *fitness costs* and *adaptation*. An adaptation is a good thing for a fish, but why might fitness costs be bad for a fish?

Fill-in the blank

Fish
Elizabeth River
Cancer

Pollution
Survive
Swim

Adaptations
Fitness costs

Mama Chog had certain strengths that protected her from _____ in the environment. These strengths helped Mama Chog _____ in the polluted river and so she passed these strengths on to her children, resulting in a stronger population of fish. These changes are called _____.

Multiple choice

1. What is an example of a physiological adaptation in humans?
 - a. Getting a suntan at the beach
 - b. Growing out your hair
 - c. Having different types of teeth
 - d. Wearing clothes
2. Trading the ability to do one thing for the ability to do another is called
 - a. Adaptation
 - b. Camouflage
 - c. Metamorphosis
 - d. Fitness cost