

Adaptation



Bats use sonar to hunt insects at night. Some lizards have tails that break off and re-grow in a few months. The wings of certain non-poisonous butterflies look exactly like those of their poisonous relatives. All these strange characteristics are the result of one important biological trait: adaptation.

Adaptation is the process by which organisms—from plants to insects to human beings—adapt to their environment. The process enables organisms that are best suited to their environment to survive. The better an Arctic fox adapts to the freezing temperatures in the Arctic, for example, the better his chances are for survival. Similarly, the less sunlight a species of tree needs in a jungle crowded with taller trees, the more successful that tree will be. In order to survive, the tree will need to adapt to its shady environment.

Adaptations come in three main types. Structural adaptations are ones you can see, like the sharp quills that prevent otherwise slow and small porcupines from being eaten. Behavioral adaptations consist of behaviors that species learned over time, such as the Blue-Footed Boobies on the Galapagos Islands, who perform a high-stepping dance during mating season to show off their bright blue feet. Finally, there are physiological adaptations, which allow species to perform different functions. The production of venom by a snake, for instance, is an adaptation that allows it to poison its prey when it bites them.

Lately, scientists have been talking a lot about adaptation. Climate change has created significant changes in our environment. The polar ice caps are melting. Flowers are blooming earlier. Lakes and rivers are drying up, causing droughts and forest fires and pushing animals

into closer proximity with human beings. Climate change has had a negative effect on some species, but a positive effect on others.

Take the mountain pine beetle. This small black beetle has decimated around 170,000 square kilometers (almost 66,000 square miles) of pine forest in British Columbia, Canada. Forty years ago, the mountain pine beetle was on good terms with the forests of North America. It lived below 9,000 feet, above which it tended to freeze to death during the winter. But warmer winters caused by climate change have allowed it to exist at heights of over 11,000 feet, where white bark pines grow.

In the past, white bark pines never had to deal with mountain pine beetles. As a result, they never developed a way to protect themselves against them. Meanwhile, warmer summers have tricked the mountain pine beetle into leaving their nests and laying eggs two months ahead of schedule. Their offspring wind up infesting a whole new crop of white bark pines before the summer ends.

If nothing is done to slow the spread of the mountain pine beetle, they may wind up destroying every white bark pine in British Columbia. That is, unless the pine figures out a way to adapt to the beetle's presence.

Another reason scientists are talking about adaptation is due to the rise in invasive species. Invasive species are species that have taken up residence in an environment where they do not belong. At the moment, the Burmese python—a type of snake native to parts of India and Southeast Asia—is an invasive species in the south of Florida. The Burmese python is wiping out the population of raccoons, possums and deer in the Everglades. That is because these mammals never had to adapt to the presence of Burmese pythons.

How did Burmese pythons wind up in Florida? Some scientists think people who keep the snakes as pets released them into the wild years ago, allowing them to breed and spread throughout the state. However it happened, there may now be over 100,000 Burmese pythons in the Everglades. And since the climate in South Florida is similar to that of the snake's native habitat in Asia, it is perfectly suited to the environment. Therefore, it poses a risk all types of species who live there—even dogs and cats.

The rise in air travel over the last fifty years has caused species to become established in parts of the world that nature did not intend them to be. The case of the brown tree snake on the

island of Guam, a territory of the United States in the middle of the Pacific Ocean, is one well-known example. Brown tree snakes are native to Australia and Papua New Guinea. At some point, however, biologists believe they snuck into the cargo holds of ships or military airplanes and hitched a ride to Guam.

In its native area, brown tree snakes eat birds, lizards, bats, rats and small rodents. But a number of natural predators have always kept its numbers down. With the exception of the occasional feral pig or mangrove lizard, however, the brown tree snake has no predators in Guam. This has allowed it to devastate most of the native bird species on the island. And since the snakes have plenty of birds and other critters to eat, they have started to grow larger than their normal size. The brown tree snake, in other words, is slowly adapting to a new style of life on Guam.

Of course, species can be threatened simply by changes in the weather. The U.S. Fish and Wildlife Service first placed polar bears on the Endangered Species List in 2008. Warmer temperatures in the Arctic have caused more ice to melt each summer, making it harder for them to survive.

Traditionally, polar bears spend the winter and spring months hunting for seals on ice floes in the ocean. During this time they bulk up as much as they can. When the ice melts in the summer, they move to solid land and live off the reserves of fat they built up all winter. When fall arrives, they gather near the edge of the sea, waiting for the ice to re-form. At that point, they venture back out and start hunting for seals.

The problem is that ice is starting to run out in the Arctic. It melts earlier and re-forms later each year, forcing the polar bear to subsist off energy reserves for longer periods. Scientists describe seeing rail thin polar bears sitting on land, waiting and waiting for the ice to form. Most bears lose around two pounds each day that they're on land. Some lose as much two thirds of their body weight during the course of a season. For comparison, that would be like a healthy 120-pound woman dropping down to just 40 pounds during the summer months. As a result, the population of polar bears in some reaches of northern Canada has declined more than twenty percent over the last twenty years.

The effect of disappearing ice has consequences for younger generations of polar bears, too. Lean, sickly-looking polar bears give birth to smaller cubs, which are unlikely to survive for long. And mother polar bears weakened by lack of seal meat have a tough time caring for their offspring, which also makes it tough for newborns to survive. In fact, due to the rapid decline

in the polar bear population, a new kind of tourism has popped up, known as “Last Chance Tourism.” People are starting to travel to remote regions of the Arctic not just to photograph polar bears, but to get a look at them before they disappear.

What effect does the decreasing population of polar bears have on other species? Well, fewer polar bears to prey upon seals means an uptick in the number of seals. But it also means that polar bears—previously nomadic, isolated animals—are starting to encroach on human terrain. Starving polar bears are being forced to raid garbage cans in towns on the edge of the tundra. In this way, they are not unlike grizzly bears wandering through a campsite scrounging for leftover pizza. As such, they may be dangerous for humans living in their vicinity.

Fortunately, many animals, plants and insects have already begun adapting to climate change. According to a recent study published in the journal *Science*, many species have adapted to increased global temperatures by moving north or into higher elevations. Over the last 40 years, the comma butterfly has relocated from central England to the city of Edinburgh, Scotland, a distance of over 130 miles. (That’s a long way for a butterfly.) A small bird native to England, known as Cetti's warbler, has moved a similar distance.

And yet many species are incapable of adapting to significant changes in climate. This is because those species had adapted to specialized—or “niche”—environments. Once the environment changes, these species cannot handle the hardship and typically die off.

The disappearance of animal species may seem like a remote concern for human beings, at least compared to things like war and economic collapse. But we tend to forget that all things are connected. As a result of climate change ocean temperatures are rising. Warmer ocean temperatures turn the water more acidic. And higher acidity in the ocean causes coral reefs to die.

Over 500 species of fish live in Florida’s coral reefs alone. If reefs around the world start to die off, so will all the fish. And around 75 percent of the world’s fish catch gets eaten by human beings. Some countries, especially island nations, rely almost entirely on fish for their daily diet. In the end, humans are also going to have to adapt to our changing environment.

Name: _____ Date: _____

1. Adaptation enables species of animals to
 - A develop traits that will only affect one generation of the species
 - B develop traits that only a few members of the species will ever have
 - C develop traits that will help them survive in their environments
 - D develop traits that will help them change their environments

2. Which of the following is *not* given as an effect of climate and weather changes?
 - A Burmese pythons killing raccoons, possums, and deer
 - B mountain pine beetles infesting white bark pines
 - C polar bears' decreased weight
 - D the comma butterfly relocating to Scotland

3. Invasive species threaten the species of the environment they have moved to. Which evidence from the text supports this statement?
 - A The comma butterfly has relocated from England to Scotland.
 - B Mountain pine beetles that are able to live at higher elevations are infesting white bark pines.
 - C Polar bears forced to raid towns on the edge of the tundra looking for food may be a threat to humans living there.
 - D Brown tree snakes that have been transported to Guam have devastated most of the native bird species on the island.

4. The passage suggests that
 - A all species of animals are in danger because of climate change
 - B some species of animals are in danger because of climate change
 - C most animals are unable to adapt to changes in their environment
 - D invasive species end up improving the environments which they move to

5. The main idea of this passage is
 - A some animals can adapt in order to survive changes to their environment
 - B scientists and environmentalists have an important task in reversing climate change
 - C climate change has caused the disappearance of too many species
 - D adaptation usually has negative consequences for animal species

6. Paragraph 5 begins, "Take the mountain pine beetle." The author uses this sentence to indicate that he

- A would like the reader to take home a mountain pine beetle
- B will next discuss the mountain pine beetle
- C desires scientists to move forward on work with the mountain pine beetle
- D has finished discussing the mountain pine beetle

7. Choose the answer that best completes the sentence below.

_____ climate change and invasive species put different animal species at risk, animals do have a chance to survive if they can adapt.

- A But
- B So
- C For example
- D While

8. Which snake is originally from India and southeast Asia but has now adapted to live with great success in south Florida?

9. Why has it been so easy for the Burmese python to adapt to life in Florida even though the natural home of the Burmese python is so far away from Florida?

10. Explain whether one species can benefit from the inability of another species to adapt to its changing environment. Use evidence from the text to support your answer.
