



# HOW ANIMALS IN DRY CLIMATES DEAL WITH WATER SHORTAGE PROBLEMS

Organisms that live in dry climates must have adaptations that allow them to obtain water. Most animals can get all the water they need by drinking it, but in dry climates that water may not be available. These animals get water from eating fatty seeds, from the sap of plants or from the bodies of the animals they eat.

**Because limited water is available, animals living in dry climates also have ways to conserve water.**

- Most animals are nocturnal, searching for food at night when the sun's heat is low.
- These animals may not have sweat glands
- These animals have highly concentrated urine and dry feces
- They might have long noses to prevent water lost from respiration; the nostril cools the air and condenses the water as the animal exhales





# HOW ANIMALS KEEP WARM IN COLD CLIMATES

Organisms that live in cold climates must find ways to absorb heat and then reduce the amount of that heat lost from their bodies.

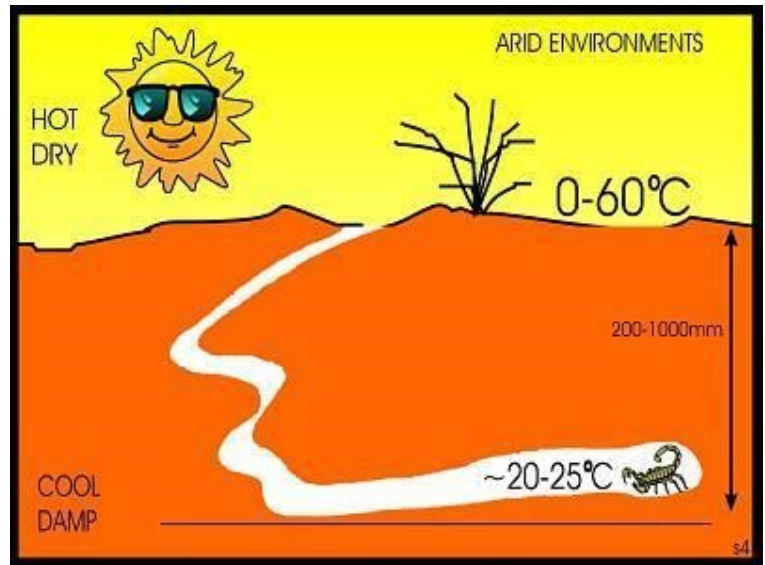
- Terrestrial reptiles keep their body temperature stable by absorbing solar radiation during the day. At night they seek shelter to keep warm and to protect themselves during the inactivity that results when they are cooled.
- Animals that live in the water usually take on the temperature of the water, which is usually stable. Some large fish and mammals warm their bodies with muscle activity, fat deposits (blubber) and thick waterproof fur.
- Birds use their feathers to protect their bodies from the cold. They also migrate to warmer climates.
- Mammals reduce heat loss in many ways:
  - ★ They may be covered in dense, fine fur that holds insulated air close to the body. Sometimes fur even covers the soles of their feet.
  - ★ They might limit their body functions during the winter months by hibernating or going into a state of dormancy.
  - ★ Since heat is lost through the surface of a body, the smaller the surface area compared to the volume of the body, the less heat is lost. There are many large animals in cold climates (their bodies have a large volume compared to the size of surface area).
  - ★ The sphere is the best shape or retaining heat. Many mammals have small round bodies.
  - ★ You lose heat first through your extremities (fingers, ears, toes, nose, head). Mammals in cold climates have small ears and tails and have short legs.



# HOW ANIMALS KEEP THEMSELVES COOL IN WARM CLIMATES

Animals living in very warm climates have many ways of avoiding the sun's heat and to keep themselves cool.

- Animals spend the daylight hours hiding in burrows or behind boulders. They come out at night to hunt and forage for food.



- Animals lose most of their heat through their extremities (ears, tails, legs, noses) Warm climate animals have long legs, ears and tails to help them loose heat. Their large ears are used to cool their bodies by running blood vessels near the surface of the ears. Air blowing past these vessels cools the blood and in turn cools the body.



- To promote evaporative cooling, animals sweat, pant and lick their bodies. These methods are not good in dry climates and they

promote water loss.

- Most animals have fine, thin body coverings.

# ADAPTATIONS TO COLLECT FOOD or CAPTURE PREY

- Some animals can use tools, for example they can use rocks to break seeds
- Mouthparts can be adapted for grabbing, biting, holding, and piercing.

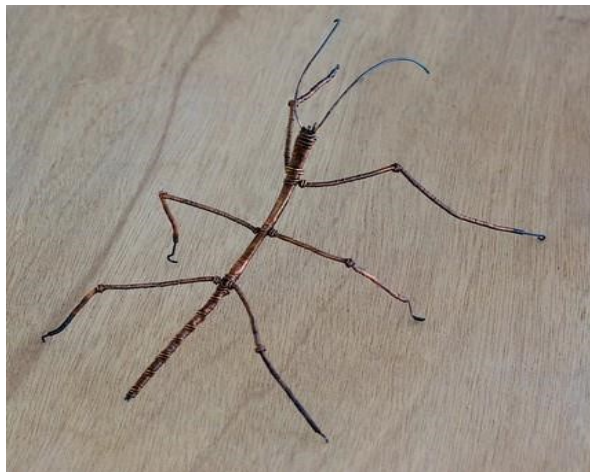


- They have different behavioral strategies to capture prey like, being cunning (sneaky), stealthy, and using surprise and confusion.
- Camouflage (blending in with the environment)
- They can be large and strong and/or fast
- Toxins to kill or paralyze
- Claws



# ADAPTATIONS TO AVOID BEING CAPTURED

- Withdrawal into a shell or burrow (hiding)
- They can use behavioral strategies like traveling as herds (in large groups), and having warning signals (ex. the white-tailed deer)
- They have strategies for counterattack like horns, hooves for kicking, wriggling, biting, stinging
- Camouflage (blending)
- Good senses of hearing, smell, sight
- Some animals can freeze in position to avoid being seen
- Some animals can use dismemberment (losing body parts when attacked that may grow back)



# VISION ADAPTATIONS

Animals have many different adaptations to help them see in different environments. Such as:

- Eyes at the tops of their heads—animals that live in the water like alligators, crocodiles, frogs and fish that live on the ocean floor have this to see and stay hidden at the same time.



- Very large eyes can provide better day and night vision.
- Eyes set on both sides of their heads—provide a panoramic view to watch for predators.
- Stereoscopic (3-D) vision to help predators and tree dwelling animals see distances more accurately.

# TEETH ADAPTATIONS

Animals have many adaptations to help them eat as well as catch what they eat. For example:

- Herbivores (like deer and horses) have front teeth (incisors) to grab grass and have large flat molars to grind food.
- Carnivores (lions and tigers) have pointed canine teeth which specialize in ripping and tearing flesh and meat and have large molars to crush bones.
- Omnivores (humans) have several kinds of teeth to tear meat and grind food.
- Snakes teeth slope backwards to help keep the prey inside as it is being swallowed.
- Sharks have two rows of teeth that point backwards to hold prey inside. Their teeth are also frequently replaced throughout the shark's lifespan.
- Rodents (beavers and mice) have special teeth designed to chisel away at food. Their teeth continuously grow and are continuously worn away by what they eat.
- Baleen whales (right and blue whales) have hundreds of thin plates between them called baleen, which they use to filter organisms from the water.
- Toothed whales (dolphins and porpoises) usually only have teeth on the bottom to catch prey, which they swallow whole.
- Elephants have tusks that are specialized incisor teeth that have grown to be used for defense, for rooting food from the ground, and for breaking branches.



# Structural vs. Behavioral Adaptations

All organisms have adaptations that help them survive, reproduce and thrive.

\* Some adaptations are **structural**. Structural adaptations are **physical features** of an organism like the bill on a bird or the fur on a bear.

- The thick fur coat of an arctic fox is a *structural adaptation*. It helps protect it against the cold weather.
- Body shape, coloring, and claws are a few more examples of structural adaptations.
- The extensive root systems and the small leaves common to many desert plants are good examples of structural adaptation.



Such roots enable the plants to collect more of the available moisture from their dry environment. Small leaves, since they provide little surface area for evaporation, reduce loss of water.

- The powerful forelegs and out-turned palms of the mole are also structural adaptations for burrowing.

\* Other adaptations are **behavioral**. Behavioral adaptations are the **things organisms do** to survive and reproduce.

- For example, bird calls and migration are behavioral adaptations.
- Moving in large groups is a *behavioral adaptation*; it helps protect the members of the group from predators.
- Bird songs are behavioral adaptations used for a variety of purposes, including attracting a mate or warding off competitors.
- Examples of behavioral adaptation can be readily found in areas where there is a seasonal change in the weather.
  - Squirrels store nuts for the winter.
  - Many birds migrate to the south to avoid cold northern winters.
  - Wood-chucks hibernate when cold weather arrives and food becomes scarce.



Continue on next page...



# PENGUIN EXAMPLE:

Some Penguins live in the Antarctic, where it is extremely cold, and the water temperatures never rise above freezing. Others live further North, but all penguins live in the Southern Hemisphere. The furthest North that Penguins live is in the Galapagos Islands. Some Penguins (Emperor Penguins) never step on land. When they are not in the water they live on ice floes. All penguins are flightless. They cannot fly at all, but they are wonderful swimmers. In Penguins the wing is known as a flipper.

## Penguin Structural Adaptations

- + They are white on the front and black on the back. In water, the only place they are really at risk from predators, this gives them camouflage. From below they are white and cannot be easily seen against the lighter surface of the sea. From above they blend in with the darker depths.
- + Penguin feathers are extremely densely packed, with no gaps between them. This gives them good protection against the cold.
- + Each feather has an extra part behind it, so that they can fluff their feathers up. This keeps them warm in the cold and allows them to cool off when the weather is warmer.
- + They don't have all the extra airspaces in their bones that normal birds have. This helps them sink in the water.



Adult penguins (on the right) have a dense layer of tiny, waterproof feathers that protect them in the water. Penguin chicks (on the left) are covered in fuzzy, insulating down that is replaced by waterproof feathers as they mature.



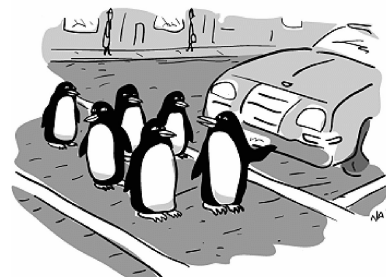
- + They have a layer of blubber (fat) beneath their skin. This helps them keep warm.
- + Emperor and King Penguins have a special flap of skin on their feet. They do not build nests from twigs and leaves. They only lay one egg, and keep it on their feet, under the flap of skin so it can't roll off. The feathers come down over the feet, keeping the egg warm.

## Penguin Behavioral Adaptations

- + Penguins live in large communities. This helps keep them warm.
- + They make their nests side by side and after the chicks are born they all huddle together to stay warm.
- + Living close together in large communities also protects them from the few predators, who might like to make a meal of them. Any walrus or sea lion happening upon them will only be able to grab one penguin from the edge of the group.
- + Penguins pick up stones and store them in their crop. This makes them heavier when they are in water.



Adapted from: [http://www.mysciencesite.com/Animals\\_and\\_Adaptation.pdf](http://www.mysciencesite.com/Animals_and_Adaptation.pdf)



Name \_\_\_\_\_

# ADAPTATION EXPERTS



**Animal Adaptations:** All animals live in habitats. Habitats provide food, water, and shelter- which animals need to survive- but there is more to survival than just the habitat. Animals also depend on their physical features to help them obtain food, keep safe, build homes, tolerate weather, and attract mates. These physical features are called physical adaptations. **Physical adaptations** do not develop during an animal's life but over many generations. The shape of a bird's beak, the numbers of fingers, color of the fur, the thickness or thinness of the fur, the shape of the nose or ears are all examples of physical adaptations which help different animals to survive.

Adapted from: [http://www.uen.org/utahlink/activities/view\\_activity.cgi?activity\\_id=4750](http://www.uen.org/utahlink/activities/view_activity.cgi?activity_id=4750)

Answer the following questions based on the information you just read:

1. What do animals depend on their adaptations to help them do?
2. How long does it take physical adaptations to develop?

**★Adaptations Station Science...**As a group read the adaptation information on the card or in the books at each station. Then answer the questions below.

**Station 1: How animals keep cool in warm climates**

3. Tell 3 ways mammals keep themselves cool in warm climates.

- 
- 
- 
- 

**Station 2: How animals keep themselves warm in cold climates**

4. What adaptations do large fish and mammals that live in the water have to keep themselves warm?

5. What adaptations do birds have to survive cold weather?

6. Explain 3 ways land mammals can reduce heat loss from their body in cold weather.

- 
- 
- 

**Station 3: Collecting Food and Capturing Prey**

7. Explain 4 adaptations animals might have to help them collect food or capture their prey.

- 
- 
- 
- 

**Station 4: Teeth adaptations**

8. What adaptation do carnivores have to help them eat their food? Why?

9. What adaptation do herbivores have to help them eat their food? Why?

**Station 4(continued): Teeth adaptations**

10. What adaptations do omnivores have to help them eat their food? Why?

11. What is the purpose of an elephants' tusks?

12. What is special about sharks' teeth? Why?

13. What is special about snakes' teeth? Why?

**Station 5: How animals deal with water problems in dry climates**

14. What are 2 ways animals that live in dry climates can get water?

- 
- 

15. What are 2 ways animals that live in dry climates can conserve the water they have?

- 
- 

**Station 6: Avoiding Capture**

16. Explain 4 adaptations animals might have to avoid being captured.

- 
- 
- 
- 

**Station 7: Vision adaptations**

17. Explain 3 different ways animals have adapted their vision to survive.

- 
- 
- 

**Station 8:**

18. What is the difference between Structural and Behavioral Adaptations?

19. Give 2 examples of Structural adaptations and their purpose

- 
- 

20. Give 2 examples of Behavioral adaptations and their purpose

- 
- 

21. Give 2 examples of Structural adaptations in Penguins and their purpose

- 
- 

22. Give 2 examples of Behavioral adaptations and their purpose

- 
-