

**THE LOUISVILLE ZOO**  
**BACKYARD**  
**ACTION HERO**  
2021 **GUIDEBOOK** 2022

Presented by

**TOYOTA**



**KENTUCKY**

TOYOTA MOTOR MANUFACTURING, KENTUCKY, INC.

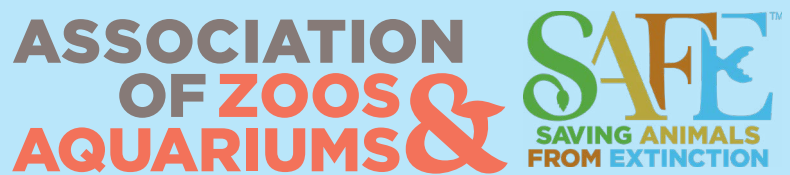


**DISCOVER ANIMAL  
RELATIONSHIPS**

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The Louisville Zoological Gardens, a non-profit organization and state zoo of Kentucky, is dedicated to its mission to "Better the Bond Between People and Our Planet" by providing excellent care for animals, a great experience for visitors, and leadership in conservation education. The Louisville Zoo is accredited by the Association of Zoos and Aquariums (AZA) and is an agency of Louisville Metro Government.



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# Welcome Future Heroes!

At Toyota Motor Manufacturing, Kentucky, Inc. (TMMK), we believe that protecting the environment is part of our mission to be a good neighbor across Kentucky. As we build cars in our plant in Georgetown, we are committed to protecting the environment, following environmental laws, preventing pollution and continuously improving our processes. Our commitment doesn't stop there — and neither should yours! It is everyone's responsibility to protect the environment.

By becoming a Backyard Action Hero, you commit yourself to taking an active step to coexist and learn about nature and wildlife. Once you have learned about some of the things in this book, you will be ready to take conservation action to your backyard and beyond. Good luck, Heroes!

*Sincerely,*

*Your Friends at*

**Toyota Motor Manufacturing, Kentucky, Inc.**

# TOYOTA



**KENTUCKY**

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## What is a Backyard Action Hero?

A Backyard Action Hero is a kid or adult who is really into nature and wildlife and is ready to take action to protect them. They care about the animals and habitats in their own backyards as well as all around the world. They know that to make a difference they need to both learn and act! This guidebook will help you learn about the natural world around you and how you can help nature in need. Since the Louisville Zoo is a great place to learn about plants, animals and ways to help our wonderful world, your guidebook will also use examples from the Zoo!

## What's in This Issue?

Have you ever wondered if animals form relationships? If you have ever watched a nature documentary, you likely already know that some animals live alone, some live in groups and some use other animals for food. All animals have relationships — and in this issue we will try to explain what these relationships look like and why they are formed.

First, you will explore competition and how it shapes the landscape where we live. Most of us feel a natural sense of competition, whether we're rooting for our favorite sports teams or playing a board game. In the natural world, competition is often a literal life-or-death struggle against other species; and sometimes even organisms from the same species compete!

Next, we will discuss why some animals live in groups and others prefer to live alone. Both tactics have benefits and weaknesses — and also vary greatly among species.

Finally, we will discuss special relationships between different organisms. Although these relationships can sometimes be helpful to one or both animals, the relationships built help keep ecosystems in balance. Just like with group living, no approach to survival is inherently better or worse, but each strategy has risks and challenges.

By understanding these relationships, Backyard Action Heroes are able to better understand the world around us, and understand where we fit into these relationships. Spoiler alert: we participate in these relationships every day without even realizing it!

## Louisville Zoo Kid's Club

This issue, we are excited to announce the Louisville Zoo Kid's Club, designed specifically to keep teachers, children and their families in the loop about what is going on at your Zoo! Kid's Club is going to kick off with our first-ever virtual meeting July 31.

**Sign up** to participate and enhance your understanding of animal relationships — and for a chance to win a cool prize. If you sign up by July 24, you can submit a question relating to symbiosis (you'll learn more about that in this issue) for a chance to win a Family Adventure Box! We will be talking more about symbiosis in the Kid's Club virtual event!



# Do Animals Form Relationships?

When people visit the Zoo, they often find themselves describing the animal interactions they observe in ways that make sense to them. We might find ourselves saying things such as “they are friends” or “they don’t like each other.” This simplified and comfortable way of making sense of animal behavior has been instilled in us from the very start. What animal relationship examples can you think of off the top of your head? Did you think of a book or movie about animals? Favorites like *Bambi*, *Finding Nemo*, *Lion King*, and many others influence how we interpret animal behavior.

While animals do form a variety of relationships, not all have such happy endings. Animal behaviors, including the relationships they have with the world around them, are created for one reason: survival. Any long-term interaction between two organisms that share a close physical space is called *symbiosis*.

As we mentioned above, most animal relationships are directly related to that animal’s ability to survive. It’s not just animals that form relationships to survive — even plants have them! Can you think of things both animals and plants need? Can you think of other needs they have that are different? Generally, animals depend on food, water, shelter and space, while plants seek out light, water and space.

If plants and animals are going to survive, they must be clever and resourceful. Animals may find safety and strength in numbers, like groups of gorillas and meerkats, or they may look for less competition for food and space by living solo. Animals may also participate in relationships outside of their own species. These relationships are equally complex and important. Some species benefit each other, providing a service or resource that helps them both survive and thrive. Some animals or plants may unknowingly be a haven that others depend on. And some relationships only benefit one party. In this issue of *Backyard Action Hero*, we will explore many different natural relationships and discuss how they impact species survival.



# Competition

Competition occurs in almost every ecosystem in nature. This relationship develops when more than one organism in an environment needs the same resources to survive. Organisms will compete for resources such as territory, food, mates, water, sunlight or space.

Organisms that are best suited for survival will be able to compete for limited resources better than organisms that are not. You may hear of this phenomenon referred to as survival of the fittest. If an organism can't access these basic survival needs in their environment, they may have to move to a new location, adapt, or they risk dying out.

Intraspecific competition occurs when members of the same species within the same ecosystem compete for the same limited resources. Let's look at some examples:

- Larger, dominant **grizzly bears** occupy the best fishing spots on a river during the salmon spawning season.
- Songbirds like eastern towhees defend territories from their neighbors to secure resources for themselves.
- Barnacles compete for space on rocks, from which they filter water to obtain their food.

In the next few pages, we'll explore how competition helps keep populations at healthy levels based on the limited amount of resources available in a given space. We'll start by looking at how intraspecific competition impacts relationships within a species.



# Intraspecific Competition

# Same-species Relationships

When you hear the word “social,” what comes to mind? If you are thinking it means interacting with others, you’re right! As humans, we live socially. We rely on other people for safety, companionship and many other things. Many animal species live in social arrangements, and we have even given them some fun group names, such as an “army” of caterpillars, a “gaggle” of geese, a “clouder” of cats or a “bloat” of **hippos**! If a species lives together in a group, it means they are social animals.

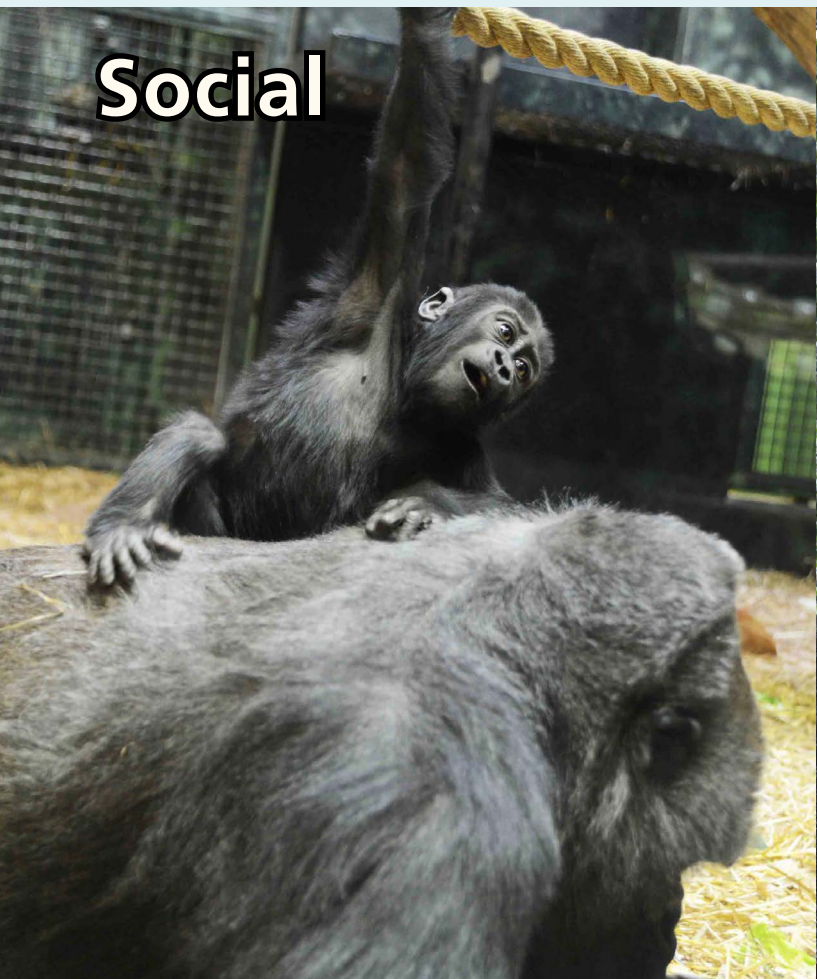
Can you think of a word that means the opposite of social? We refer to animals as “solitary” when they prefer to live mostly by themselves. These are animals that rarely interact with other individuals in their species, often times only coming together to breed. They are independent!

Do you think it’s better to live a social or a solitary life? Or are there advantages and disadvantages to both?

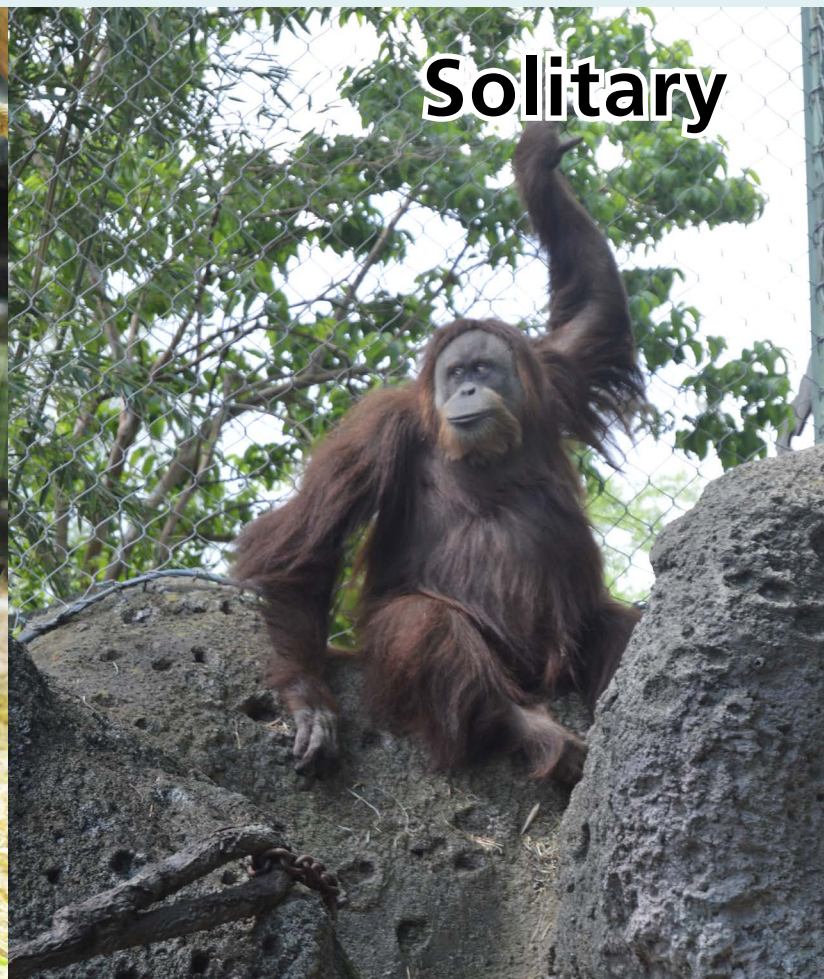
As with most things in the natural world, situations can be complex. Both ways of living have advantages and disadvantages. But you’ll find that living arrangements work for the survival of the species, whether social or solitary.

Even animals that seem similar like **gorillas** and **orangutans** have different approaches to survival. Despite their apparent similarities, the two species have wildly different survival strategies. Gorillas find success in being social animals and living in family groups; even male gorillas will come together to form bachelor groups until they can find a family group of their own. Orangutans are solitary animals who live most of their lives alone in the forest canopy unless they are raising young.

**Social**



**Solitary**





# Social Living

Living a social existence has lots of advantages for many species, and you probably know some of them already! As with all things in nature, there is no single strategy that is inherently better than any other. Social living has several disadvantages as well.



## Advantages

- There is safety in numbers with more eyes, ears, and noses looking out for danger. Imagine a herd of **zebras** all quietly grazing together. While they eat, their senses like hearing and smell alert for potential predators.
- Animals may cooperate to find food. Female lions will often hunt together when their prey is large or difficult to catch.
- Animals can work together to protect the young: Groups have a better chance of defending young who can't defend themselves.
- The group can work together to care for members that are injured or sick. **Elephants** are known to be helpful to others in their groups who are sick, injured or in distress.

## Disadvantages

- There is more competition for food and water resources. When animals live in groups, food is not always shared equally! Sometimes, whichever animal eats the fastest gets the most, or access may be based on a social dominance order.
- There may be an increased chance of diseases and parasites spreading within the group (think about social distancing with COVID-19).
- Large groups are highly visible, and therefore more vulnerable to predators.
- Individuals may have to battle for mates. White-tailed deer males will compete for females that live in the same area. The bucks with the largest bodies and antlers will often win!



# Zebra Migration Activity

For many animals, both social and solitary, migration is a key survival tactic. Migration is the seasonal movement of animals from one region to another. Animals migrate for a variety of reasons including breeding, access to food or water, and even to shelter from extreme weather. In Kentucky, we see birds like Canadian geese migrate south for the winter.

In Africa, where **zebras** live, seasons are split up into a dry and a wet season. During the dry season, much of the territory zebras inhabit turns into arid grassland with little food available for zebras or other large herbivores (plant eaters). To survive this rapid change, zebras, along with many other animals, migrate to areas that are less affected by the dry season. This migration isn't easy, however. Many predators and other challenges lay in the zebras' path.

To learn about zebra migration, try this game. You are a herd of zebras attempting to migrate to where the grass is greener by moving one square at a time.

Open [this link](#) for the answer key and watch the video below to learn how to play the Zebra Migration Game!



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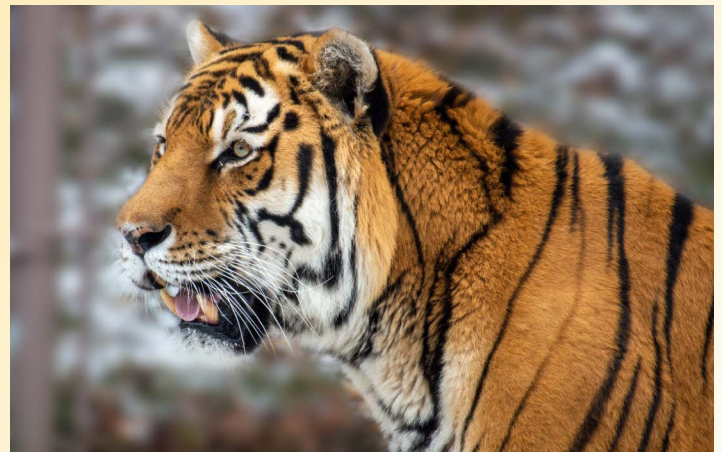
# Zebra Migration Activity



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# Solitary Living

Animals that are solitary spend most of their lives apart from others of their own species, except when mating or raising babies. However, living a solitary existence does have advantages for some species! Can you name some advantages and disadvantages?



## Advantages

- Food does not have to be shared. For example, **polar bears** hunt and eat seals by themselves. So they don't have to share any of that valuable blubber.
- Each individual has less competition for space. Solitary animals, like **tigers**, roam their own territories freely, without being pushed out or held back by other tigers.
- The more spread out individual animals are, the less likely they are to get diseases or parasites from others.
- An individual animal can move and hide more easily from predators. If an animal moves along by itself, such as the solitary box turtle, its chances of being detected are far less, and it can easily hide.
- Animals can choose a mate without competing for one within a group. If there is no need to fight for a partner, there are no injuries from competitors!

## Disadvantages

- Animals living by themselves can be more vulnerable to predators. If you are an animal living by yourself, like a raccoon, you must rely totally upon your own senses to detect danger, and there is no group to protect you from being the sole target of a predator.
- It could be more challenging to find a mate. Solitary animals may have to travel great distances and employ special tactics to find a mate.
- Individuals may have a more difficult time locating food and water resources. Without others searching alongside you, it may take longer and be more tiring to locate food.
- No protection or assistance if hurt or sick. For example, **snow leopards** live a solitary life in the cold, snowy mountains of Central Asia. If you are an injured snow leopard, you may not be able to hunt, which means you can't eat and ultimately, you may not be able to survive.

# Does “Alone” Mean “Lonely”?

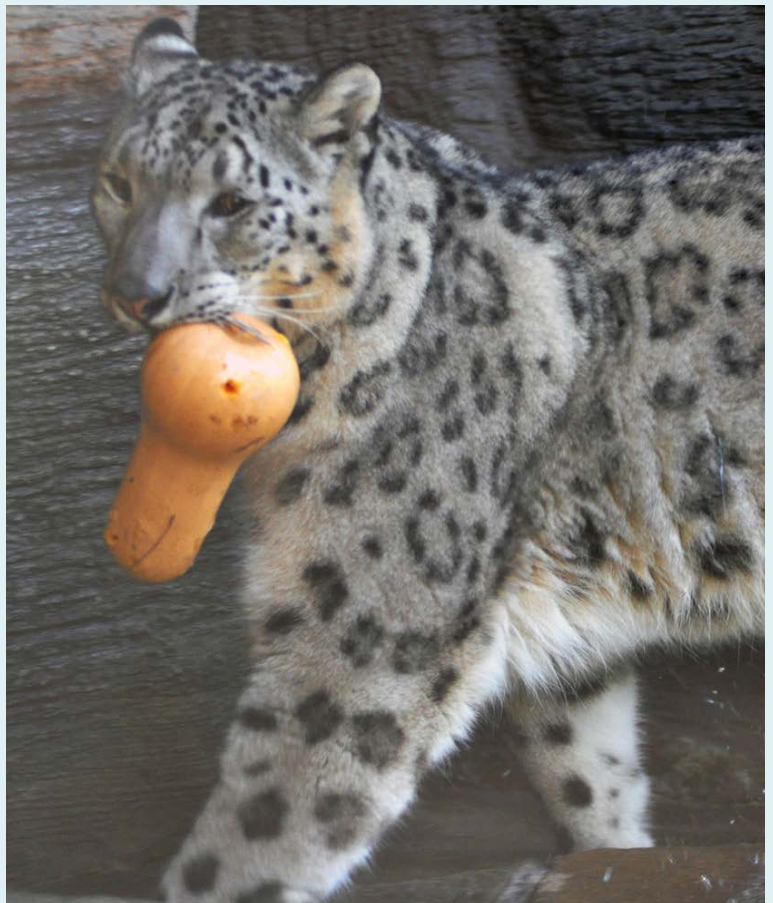
If you have visited the Zoo, you have likely watched some of our animals going about their days independently and wondered “Where are the others of its kind? Does it feel sad? Does it feel lonely?”

Here at the Zoo, it’s important that staff members know all about the natural history of the animals they care for. Natural history is the study of animals and plants in the wild, and their environments. Since we know, for example, that the natural history of tigers is that they live a solitary life, we will recreate that independent lifestyle here. In the wild, tigers see other tigers as competition for territory and prey, and they would most likely not get along if they ran into another adult, unless it was time for them to find a mate and have offspring (babies). It is natural and comfortable for a tiger to be independent.

So, at the Zoo, although we may have more than one, each will live in a separate space — either taking turns being on and off exhibit or moving individually between various exhibit spaces.

Orangutans, polar bears and snow leopards are a few more examples of animals that feel at ease spending time by themselves at the Zoo, as they would in nature. No company of others? No worries!

Now that you know the scoop, you can educate family and friends!



# Classification Activity

**A. Business**

**B. Army**

**C. Tower**

**D. Crash**

**E. Cloud**

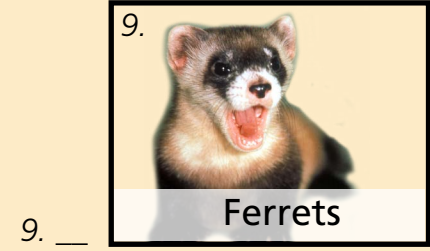
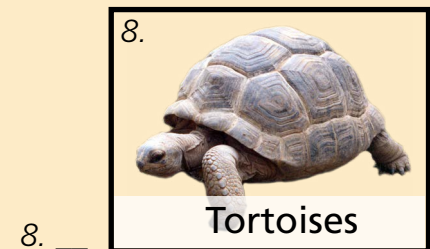
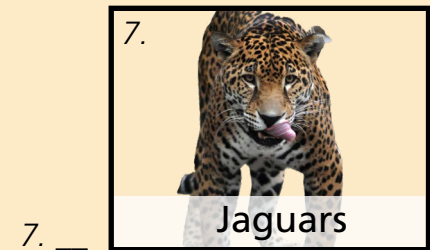
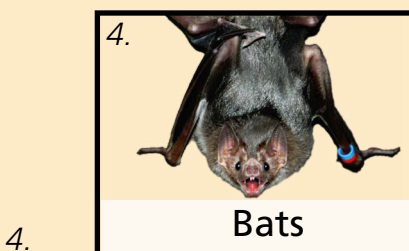
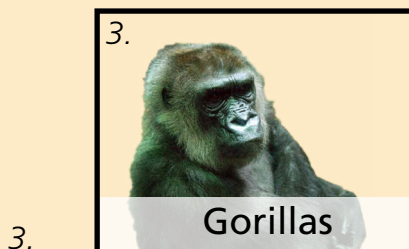
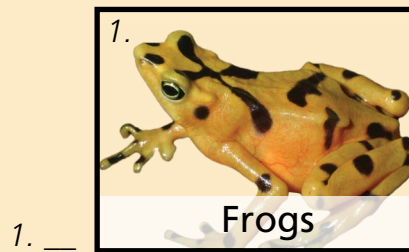
**F. Band**

**G. Shadow**

**H. Wake**

**I. Raft**

**J. Creep**



# Interspecific Competition

Animals that share a physical space often compete with one another. Interspecific competition occurs when members of more than one species compete for the same resource. In Africa, **lions** compete with each other for valuable resources like mating rights, but they also must compete with other African carnivores like hyenas for food, water and space. Interspecific competition among carnivores usually does not have an equal impact on each competitor; the larger competitor usually wins in an outright fight. If two or more species compete for the same resource with the same strategy, one will be successful and the others will need to adapt or move on — or perish. If hyenas and lions had to fight for every meal, it is likely hyenas would not be successful; but because the two species use different tactics, they achieve different results from hunting and scavenging.



Plants also compete for space, nutrients and resources such as sunlight and water. This competition shapes the way an ecosystem looks, and happens both above and below the ground. High above the ground, the leaves of tall trees block sunlight from the forest floor, which results in plant adaptations such as shorter life cycles and higher shade tolerance for those that are grown on the forest floor. This is the result of symbiosis, or any long-term interaction between two organisms that share a close physical space.

Competition can be a powerful force affecting the growth, distribution and abundance of populations in nature. Ecosystems are delicate. When we disrupt the natural systems in place, the consequences can be devastating and unpredictable. When a species is moved from its natural environment to a new area, the results are almost always detrimental. These invasive species compete with native species for resources.

## Invasive species in Kentucky

If you have ever seen kudzu, you have seen an invasive species! Kudzu out-competes native Kentucky plants by growing around them and shading them from sunlight, which they need to photosynthesize and create energy. As Backyard Action Heroes, we know that kudzu and native plants are both competing for space and access to sunlight.

Invasive species can destroy entire habitats if left unchecked, as they throw off the delicate balance in those ecosystems.



# Predation

Predation is a type of symbiosis where one organism gets energy from consuming other organisms. However, most energy starts out as radiation from the sun and is then transferred into our food chain. Producers, like plants, use a process called photosynthesis to create energy out of sun radiation. This energy is then passed to our first predator, herbivores.

Herbivores are not often thought of as predators, and plants are not often thought of as prey, but they most certainly are! The many unique predator and prey relationships drive evolutionary change and influence unbelievable adaptations.

Evolutionary adaptation is the adjustment of organisms to their environment to improve their chances at survival. If the predators adapt to be more efficient hunters, then the prey must also evolve to survive. On the other hand, if the prey can easily avoid becoming the next meal, then the predator must adapt to survive. All living things (plants and animals) have adaptations that influence their ability to survive and successfully reproduce. An adaptation can be structural, meaning it is a physical part of the organism, or it can be behavioral, affecting the way an organism responds to its environment.

<b>ADAPTATIONS IN PREDATORY RELATIONSHIPS</b>	<b>PREDATOR ADAPTATIONS</b>	<b>PREY ADAPTATIONS</b>	<b>PLANT ADAPTATIONS</b>
Physical: Changes to an organism's body to help it survive.	Designed to track and subdue prey: echolocation, excellent sight, good sense of smell, venom, a strong jaw, sharp claws.	Designed to locate and avoid predators: excellent hearing, eyes located on the side of the head, coloring, hooves.	Designed to discourage unwanted predation: thorns, roots to anchor themselves, broad leaves, or toxins.
Behavioral: Changes in actions to better respond to the environment.	Behavior reflects physical adaptations and aids in hunting prey: being nocturnal, waiting in ambush, stalking prey, or hunting in groups.	Behaviors to help avoid or flee from predators: hiding, using warning calls, living in groups, being nocturnal, or migrating.	Behaviors to avoid predation and allow better access to resources: becoming dormant, growing towards the sun, shallow roots, or deep roots.

The predator-prey relationship tends to keep the populations of both species in balance. As the prey population increases, there is more food for predators. So, after a some time, the predator population increases. As the number of predators increases, more prey are captured, and the prey population goes down. As one population increases or decreases, the other adjusts. It's these interactions that create sustainable ecosystems.

# Predator Prey Activity

This game demonstrates how animals use their senses differently than humans, and shows that not all animals primarily rely on sight to hunt. An animal's senses are specially adapted to help the animal better compete in its environment.

Predators' senses evolve to help them locate and capture prey, while prey develop senses which help them detect and avoid predators.

## What will I need?

- A blindfold; this could be a sleeping mask, bandanna, or anything to cover eyes. Try to find something that doesn't cover the ears.
- Something that can be held in a hand and makes noise, like a small container of rice or pennies. Kids can also just make noises continually like the animal they are imitating!
- People to play with; gather family, friends or classmates — at least 10 people is best.
- An area to play; the best place is a wide open area, such as a yard, gym, etc.

## Instructions

Have the group form a circle, and have everyone spread out so that fingertips can touch when arms are held straight out at the sides. This forms a safety circle that helps the people in the middle stay in bounds.

Next, choose one person to be the Predator (an animal that hunts and eats other animals) and one person to be the Prey (an animal that is hunted and eaten). Have the Predator and the Prey both stand inside the safety circle. Because hunting is difficult, blindfold the Predator and give the shaker to the Prey. \*Always ask who would like to participate — do not make anyone be in the middle if they are not fully comfortable and eager to do so!

The Predator chooses an animal that hunts, such as a lion, snake hawk or wolf. Based on the Predator animal, the Prey chooses an animal that the predator might eat. For example, a hawk might eat a rabbit or a lion might eat a gazelle.

On your "GO", the Prey begins to make noise while the Predator listens and tries to tag the Prey for a successful hunt! Limit the time for each round, or see how long it takes for each animal to catch their prey. There is no need to run — instead, the Prey should try to maneuver in a way so the Predator is eluded. The Prey must make their noise continuously. The rest of your group forms a safety circle around the Predator and the Prey. Have fun!





# Mutualistic Relationships

Another type of symbiosis is mutualism. This is the type most people think of when they hear the word symbiosis. Mutualism occurs when two organisms of different species join together and both benefit from their interaction. This relationship helps both organisms survive. Can you think of any animal relationships you've seen like that?

One of the most well-known examples of mutualism is the oxpecker bird and rhinos or zebras. Oxpeckers eat parasitic insects off the skin of rhinos and zebras, giving the bird a tasty meal and helping the rhino or zebra to be free of the annoying pests. Since this relationship benefits both animals, it's a great example of mutualism.

Why do you think some animals band together in mutualism? Animals in a mutualistic relationship are not in direct competition for resources. Rhinos are not competing with oxpeckers for food, so it benefits both animals when the oxpecker eats bugs from the rhino's skin.

Another example you might be familiar with is the relationship between humans and dogs. Humans benefit by gaining a companion who provides security; while dogs benefit by getting company, food and shelter. This relationship, as well as most of our relationships with pets, is a great example of mutualism.



# Mutualist Matching Activity

# Commensal Relationships

Commensalism is another kind of symbiotic relationship between organisms. Commensalism is when one animal benefits from a relationship and the other doesn't, but neither animal is harmed. This kind of relationship often involves one animal or plant using another for transportation or shelter. The unaffected organism is called the "host."

This relationship can be a little confusing to find; after all, in most relationships each animal is affected in some significant way. You're probably familiar with birds' nests. A bird builds its nest in a tree (the host) which gives the bird shelter, but doesn't affect the tree since the nest is so small and light.



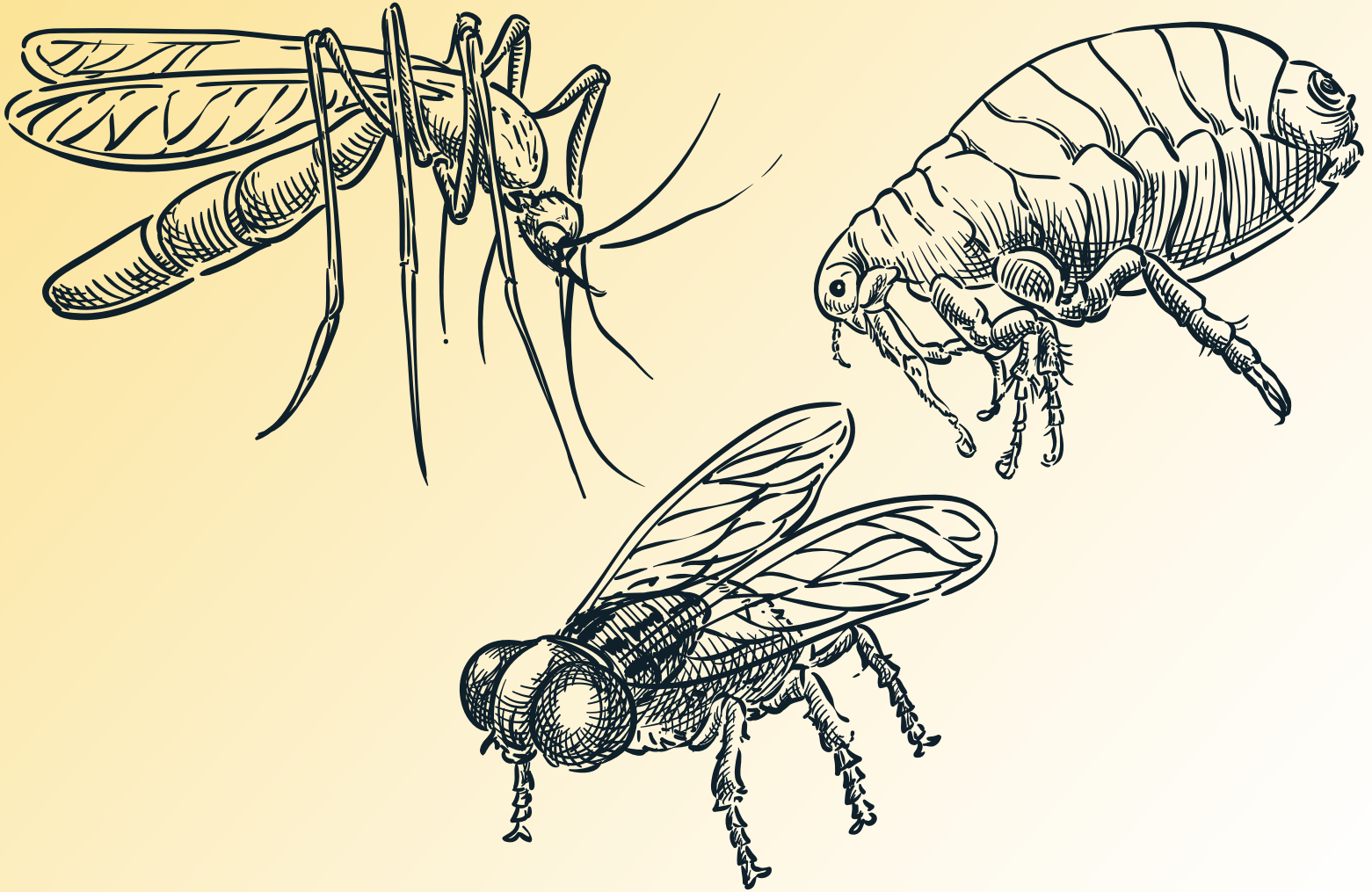
This kind of relationship evolved just like the other symbiotic relationships — because of competition! In commensalism, one organism is fulfilling their need for food, water, shelter or space while the host is unaffected. In a commensal relationship, the host organism has no need to change. Its behavior and biology remain the same, so the other organism can continue to thrive.

Believe it or not, you are participating in commensalism right now! Humans have different kinds of bacteria that live in our gut, and some of it helps us digest food and stay healthy so it is mutualistic in nature. We have other kinds of bacteria which do not directly affect us positively or negatively; as we just learned, that means that we share a commensal relationship with that bacteria!

# Commensal Relationships Activity

# Parasitic Relationships

Parasitism is a relationship between two organisms where one of the organisms (the host) is harmed by the other (the parasite), who benefits. In a parasitic relationship, the parasite gains something from the relationship, often food and/or shelter, while the host organism is harmed.



Have you ever seen a tick or had one bite you? Ticks are a great example of parasites. Ticks attach themselves to a variety of hosts from dogs to deer, and feed on their blood. The tick is gaining nutrients while the host is losing nutrients. This can be especially harmful to the host animals since ticks often carry diseases and their bite can even lead to infections.

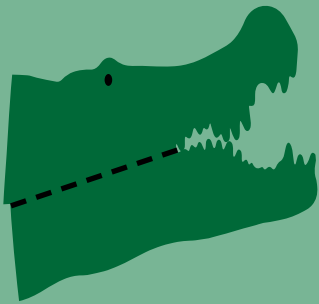
Have we talked about any relationships so far that sound similar to parasitism? If you think predation sounds a lot like parasitism, you're right. Parasites are a modified type of predator, since they feed on other organisms and harm them. The difference between the two is that parasites don't directly kill their prey. Parasites attempt to feed on live hosts, whereas predators have the intention to kill their prey and devour as much of them as possible.

Humans, like most organisms, participate in parasitism. Mosquitoes, ticks, fleas, bedbugs and lice are some of the better known parasites here in Kentucky. All of these parasites can use humans for nourishment, which makes us the host species in these parasitic relationships.

# Symbiosis Craft

For this craft, you will need a clothespin, Popsicle stick, paper, glue and scissors. Choose any combination of organisms that share some kind of symbiotic relationship. Draw the host or predator as the larger animal. Your parasite or prey should be smaller, so it fits on a Popsicle stick. The example below is for predation but can be adapted to most symbiotic relationships!

1. Draw your animals and cut them out so that the larger one opens (in this case the mouth opens but they may open differently based on the animal's relationship.)



2. Position your smaller organism on the top part of the Popsicle stick and glue it down.



3. Position the clothespin so that it opens to show the smaller organism. Glue the Popsicle stick to the clothespin on the metal so that it can still open and close.



4. Glue your large organism so that they open and close together. Then, you can use this to show off your knowledge on symbiosis!



All animals have various relationships with one another. These relationships are called *SYMBIOSIS* : any long-term interaction between two organisms that share a close physical space.

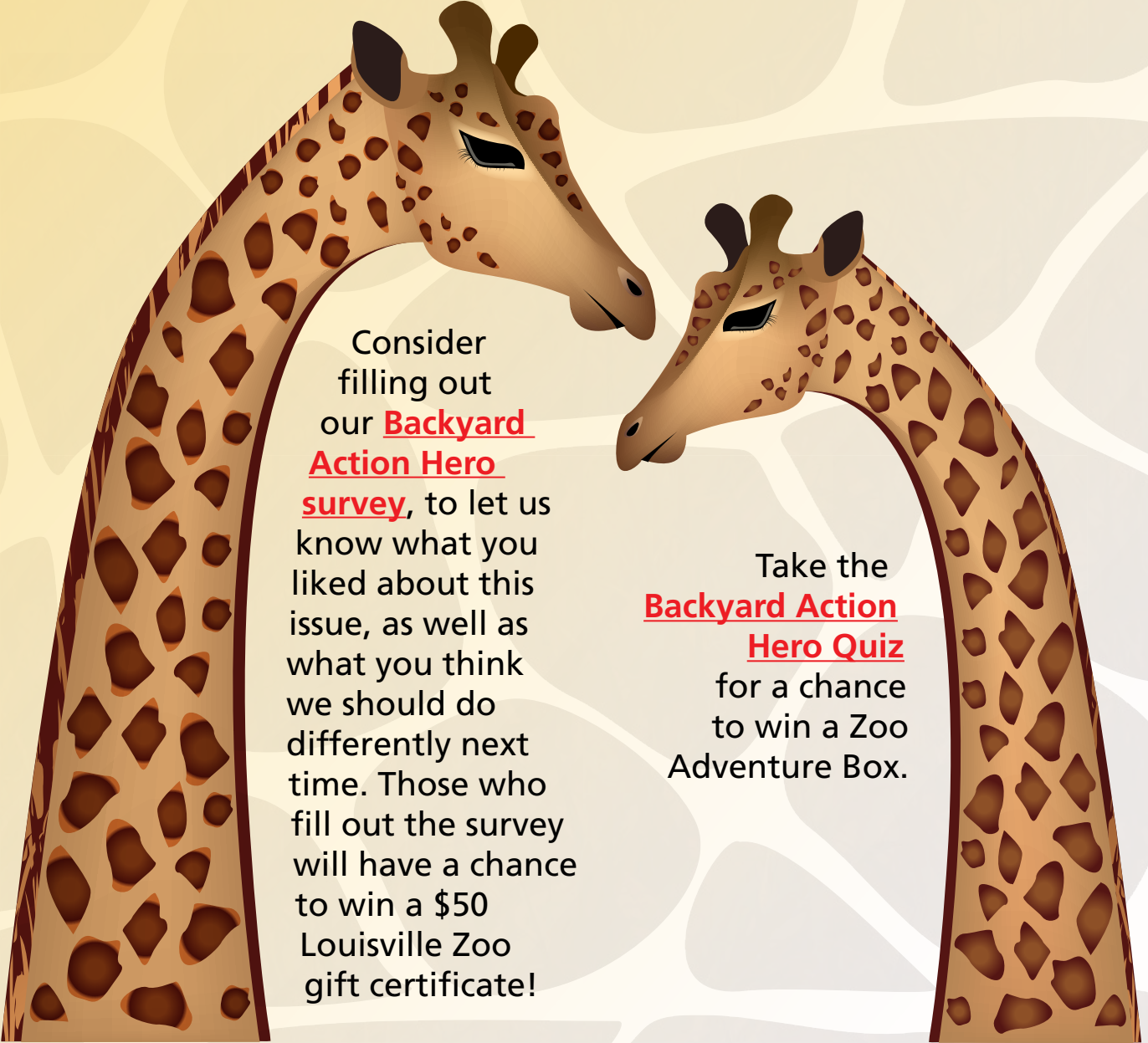


# Animal Relationships

In this issue, we learned that animals, like all organisms, form relationships both with organisms of their own species and organisms of different species. We also talked about the benefits and drawbacks of being a social animal, one that interacts with others of its own species, or a solitary animal, one who avoids others most of the time. Humans are social animals. We often work together as a team to achieve common goals.

There are many different types of relationships that occur in the natural world. Many of these relationships are changing due to humans — and often not in a good way. Invasive species, climate change and human alterations to natural habitats are causing a shift across the natural world. Without action, many of these relationships and organisms could disappear.


Luckily, if we are mindful of how we interact with our environment, we can minimize how we affect others. To learn more about how you can help, and how we fit into the natural world, visit the Louisville Zoo or read more issues of [Backyard Action Hero](#) on our website! Don't forget to sign up for the [Louisville Zoo Kid's Club](#) to stay up to date on everything kid-related going on at your Zoo, and for a chance to win cool prizes!

An illustration of two giraffes, one larger than the other, facing each other. They have brown and tan spotted patterns on their bodies and necks. The background features a pattern of light-colored, irregular shapes resembling leaves or petals.

Consider filling out our [Backyard Action Hero survey](#), to let us know what you liked about this issue, as well as what you think we should do differently next time. Those who fill out the survey will have a chance to win a \$50 Louisville Zoo gift certificate!

Take the [Backyard Action Hero Quiz](#) for a chance to win a Zoo Adventure Box.





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