Hybrid Animals

A Reading A–Z Level Z Leveled Book
Word Count: 1,647

LEVELED BOOK • Z

Hybrid Animals

Connections

Writing

Write an informative article for a local paper on the science of hybrid animals. Include the benefits and challenges so readers are fully informed.

Math

Research five different hybrid animals not included in the text. Describe how the hybrids compare to their two parent species. Use glossary words in your description.

MULTI LEVEL Z·Z¹·Z²

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Focus Question

What are the pros and cons of interbreeding different species?

Words to Know

adapt	offspring
DNA	reproduce
fertilize	species
genetic	sterile
hybrids	test tube
interbreeding	transgenic

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Cover: A four-day-old zedonk—a rare cross between a zebra and a donkey—stands near her mom.

Title page: You can't tell by looking, but twin kid goats Armstrong (left) and Sweet Pea (right) contain DNA from spiders!

Page 3: This wolphin is a cross between a bottlenose dolphin and a false killer whale. Even her teeth show that she is a hybrid: bottlenose dolphins have eighty-eight, false killer whales have forty-four, and she has sixty-six.

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Correlation

LEVEL Z	
Fountas & Pinnell	U–V
Reading Recovery	N/A
DRA	50

Table of Contents

What Is a Hybrid Animal?

The ancient Greeks imagined creatures that were half one animal and half another—centaurs and minotaurs, griffons and manticores. These creatures may not exist, but animal **hybrids** do. They combine the traits of different **species**—and they are more common than most people realize.

A hybrid is an animal that has parents of two different species. For instance, horses and donkeys are different species, but they are similar enough in appearance and behavior that they can mate with one another. If the mother is a horse, the baby is called a *mule*, and if the mother is a donkey, the baby is called a *hinny*.

If different species mate, they don't always give birth to hybrid young. Parent species that are too different may not have live **offspring**, or their young may be weak or unhealthy. When two species do produce healthy offspring, though, the young usually have a combination of the parent species' characteristics. The more closely related the parent species are, the more likely they are to have healthy hybrid offspring.

Similar, but Not the Same

Female Parent		Male Parent		Offspring
Horse	×	Donkey	=	Mule
Donkey	×	Horse	=	Hinny

Hybrid animals often have different names depending on which species acted as which parent. That's because the characteristics of the hybrid animal are often determined by which species was the mother. In the case of donkey-horse hybrids, mules are generally larger and hardier than hinnies.

Mule

Most of the time, hybrid animals can't **reproduce**. That's because reproductive cells—eggs and sperm—are trickier to make than regular body cells.

Take the mule: every cell in its body gets half its **DNA** from Mom (a horse) and half from Dad (a donkey). DNA molecules carry instructions for how cells operate—instructions for everything from hair color to ear shape. They encode the information that makes a horse a horse and makes a donkey a donkey.

Horse and donkey DNA carry much of the same information, which is why mules can survive. Even though their cells don't have a full set of horse DNA or donkey DNA, they still have all the information they need to function.

However, information is arranged differently on horse and donkey DNA. When the mule's body tries to make reproductive cells, the mismatched DNA molecules throw a wrench in the gears.

Two species have to be closely related to produce hybrid offspring when they mate, but they have to be *really* closely related for their offspring to make healthy reproductive cells.

Human-Made Hybrids

People have bred hybrid animals, such as mules, since ancient times. Mules are hardier and more sure-footed than horses. They are also less sensitive to heat and less prone to injury.

Zebra hybrids, sometimes called *zebroids*, are a more recent hybrid. Wild zebras are extremely difficult to train but are resistant to many diseases that affect horses and donkeys. Zebroids inherit a gentler personality from their domesticated parent and resistance to disease from their wild parent.

A zebra-donkey hybrid shows traits of both.

Another recent hybrid, the *beefalo*, combines the traits of bison (buffalo) and domesticated cattle. Bison are much hardier than cattle and produce meat lower in fat than standard beef. However, like many wild animals, bison are difficult—even dangerous—to handle.

Beefalo hybrids are as easy to handle as ordinary cattle but have bison's hardiness and independence. Like bison, beefalo are able to withstand both hot and cold temperature extremes. They produce meat that is low in fat and the bad type of cholesterol, with more protein than beef.

A *liger* is a hybrid of a male lion and a female tiger. Ligers grow about twice as large as either parent species; the largest known healthy male weighs nearly 1,200 pounds (544 kg)! They are usually tawny colored, like lions, with pale bellies and faint stripes, like tigers.

Hercules, the world's biggest cat, poses with little brother Aries. Both are ligers.

Ligers never occur naturally since lions and tigers live in different habitats. Accredited zoos avoid **interbreeding** the big cats, but independent breeders sometimes raise big cat hybrids as curiosities. Other big cat hybrids include *leopons* (leopard × lion), *jaguleps* (jaguar × leopard), and *lijaguleps* (lion × jagulep).

Until recently, people could only obtain hybrids between species similar enough to mate with each other. Some species, while somewhat similar, can't—or won't—mate, so their hybrids didn't exist. For instance, even if given the opportunity, camels and llamas would rarely mate.

When modern medicine provided a way to **fertilize** eggs in a **test tube**, a camel-llama hybrid became possible. Scientists hope this hybrid, called a *cama*, will couple the camel's strength and hardiness with the llama's sweeter disposition.

Natural Hybrids and the Tricky Definition of Species

Hybrid animals can arise whenever related species interbreed—which can occur whenever they live in the same environment. Identifying hybrids can be surprisingly difficult, though, because it's surprisingly difficult to define when animals are separate species.

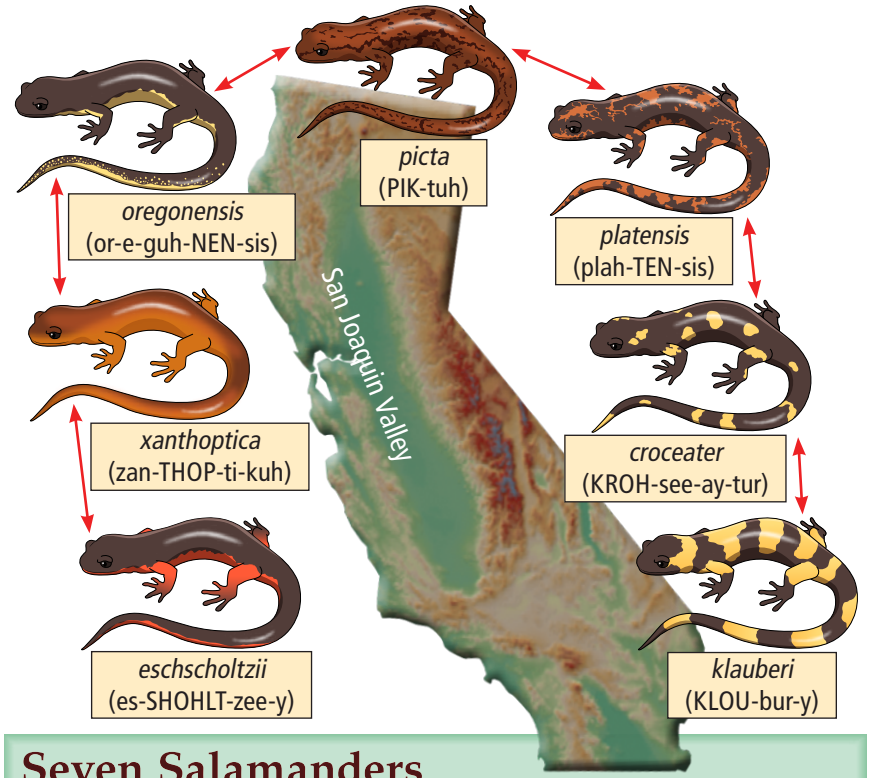
Scientists often define a species as a group of individuals with two important characteristics.

1. They have the potential to interbreed in nature.
2. If they *do* interbreed, they produce healthy, fertile offspring—that is, offspring that are able to reproduce.

Same or Different Species?

It can be difficult to tell whether two animals are the same species based on appearance alone. These two dog breeds look quite different from one another, but they are considered the same species—*Canis lupus familiaris*. Two fruit flies may look like twins but actually be different species.

Ring species provide a great example of how it can be difficult to determine the line between hybrids and distinct species. To understand ring species, imagine a group of preschoolers sitting in a circle. Each child represents a separate species sitting within arm's reach of two others.



Seven Salamanders

These salamanders were once the same species but their traits diverged as they moved south and formed a ring around the San Joaquin (wah-KEEN) Valley. They can still interbreed with their immediate neighbors—except at the point where their extremes overlap. In southern California, *eschscholtzii* and *klauberi* salamanders do not interbreed. The ring is broken.

Now imagine them playing a game of telephone: the first child whispers to the second, who whispers to the next, and so on. When the last child gets the message, it's usually completely different from the starting words!

The changes in the whispered message are similar to the changes seen around a circle of ring species. Each species is similar to those on either side—similar enough that they can interbreed—until you get back to the starting point. The starting and ending species are the most different from one another and cannot interbreed.

Ring species *Ensatina eschscholtzii*

When Species Overlap

Evidence suggests that ring species members change slowly as they **adapt** to specific environmental conditions. The ranges of individual species overlap in some regions; where they do, hybrids arise. With far more of each parent species than the hybrids, though, the parent populations are not greatly affected.

Sometimes two species that were isolated from one another are brought together abruptly. In this situation, hybrids can cause problems for their parent species by competing for food, territory, or other resources. They may compete for mates, potentially changing the **genetic** makeup of the original species.

Over the past decades, changing environmental conditions due to climate change have brought together many previously separated species. Climate change has had its greatest effects in the Arctic, where some native species are changing their natural ranges in response to rising temperatures and melting sea ice. Animals from farther south that might have previously found northern regions too cold are extending their ranges northward.

The result is that species that used to be geographically separate—such as grizzly and polar bears—now interbreed. One of the first grizzly-polar bear hybrids, called a *grolar bear*, was spotted in 2006. The bear had thick white fur, brown legs and paws, and a wide, grizzly-like head. Other grolar bears have been identified since that time, which suggests that grizzlies and polar bears are regularly interbreeding in the wild.

While not a confirmed grolar bear, this bear's body shape, short neck, and odd face (when compared to other polar bears) suggest that it is a grizzly-polar hybrid.

What's the Big Deal?

So grizzlies and polar bears might have some brown-and-white grolar bear cubs. Is that really a big deal?

If plenty of polar bears roamed the world, the answer might be no. The problem is that polar bears are at risk of going extinct—so every polar bear birth makes a difference.

It becomes a numbers game: the more polar bears interbreed with grizzly bears, the more their genes—specialized for surviving in the harsh Arctic environment—get diluted by grizzly bear genes. Eventually, polar bears might simply disappear.

On top of that, grolar bears may not be very well adapted to either of their parents' environments. Grolar bears in a German zoo seem to have a polar bear's instinct for seal hunting but not its strong swimming ability. At this point, no one knows whether these hybrids survive as well as non-hybrids in the wild.

Creatures by Design

What if you want a hybrid animal that combines traits from species so different that even mating in a test tube won't work? How about these traits: the ability to produce spider silk (an ability unique to spiders) and the ability to produce lots of milk (an ability limited to mammals)?

Spider silk is stronger and more flexible than steel or Kevlar, as well as resistant to bacterial growth. These traits make it ideal for many medical uses. Researchers hope to use it to create artificial ligaments or nearly invisible stitches for eye surgery patients.

Unfortunately, it takes fourteen thousand spiders to make one ounce of silk. Since spiders tend to eat their neighbors, large-scale "spider farms" are out of the question. Instead, scientists used genetic engineering techniques (directly manipulating an animal's genes) to insert spider silk proteins into goat DNA. The goats then produce spider silk proteins in their milk, which is easy to collect. Someday, researchers hope to engineer goats that can produce commercially useful amounts of spider silk.

Since spider genes were inserted into goat cells in a laboratory, "spider goats" are considered **transgenic** rather than hybrid animals.

Animal Hybrids: Problem or Solution?

In the past, scientists thought that animal hybrids represented an evolutionary dead end. Most hybrids were **sterile**, and even those that could reproduce usually carried a combination of their parents' traits. The parents were probably well adapted to their specific environments; by combining their characteristics, the hybrid would end up adapted to neither. In most cases, this is exactly what we see in nature: hybrid species are usually poorly adapted to their environments and often fail to survive and reproduce.

However, when a species faces drastic environmental changes, it may not be able to adapt to the new conditions quickly enough to survive. Hybrids provide a way for two species to exchange genetic information. A hybrid animal could potentially gain traits that would allow it to survive where one or both parents could not.

Are hybrid animals a threat to the survival of at-risk species like polar bears? Or are they nature's way of helping species cope with rapidly changing environmental conditions? They may be a bit of both—only time will tell!

Glossary

adapt *(v.)* change to fit a new or specific situation or environment (p. 11)

DNA *(n.)* a code that carries genetic information about a living thing (p. 5)

fertilize *(v.)* to combine male and female reproductive cells to create a new animal or plant (p. 8)

genetic *(adj.)* having to do with heredity and variation in living things (p. 12)

hybrids *(n.)* offspring produced from two different parent types, breeds, or species (p. 4)

interbreeding *(v.)* mating two different species of animals to form offspring with a combination of traits from each parent; crossbreeding (p. 8)

offspring *(n.)* a person's child or another animal's young; descendants (p. 4)

reproduce *(v.)* to make offspring that are similar to the original living thing (p. 5)

species *(n.)* a group of physically similar living things that can reproduce (p. 4)

sterile *(adj.)* not able to produce offspring (p. 15)

test tube *(n.)* a narrow glass tube that is closed at one end, commonly used in scientific laboratories (p. 8)

transgenic *(adj.)* of or relating to an organism whose DNA has been altered by the transfer of genes from another species or breed (p. 14)