Hybrid Animals

A Reading A–Z Level Z1 Leveled Book
Word Count: 1,794

LEVELED BOOK • Z[1]

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·Z[0]·Z[2]

Written by Cheryl Reifsnyder

www.readinga-z.com

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Focus Question

What are the pros and cons of interbreeding different species?

Words to Know

adapt
chromosomes
DNA
embryos
fertilize
genetic
hybrids
interbreeding
offspring
reproduce
species
sterile
susceptible
test tube
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: 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.

Page. 3: A Boy Scout gets a kiss from a dog-wolf hybrid.

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Correlation

LEVEL Z1	
Fountas & Pinnell	W–X
Reading Recovery	N/A
DRA	60

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*.

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

When 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 that they can have healthy hybrid offspring.

Like many hybrid animals, mules and hinnies are **sterile**—unable to give birth to their own young. This situation stems from the fact that different species of animals often have different numbers of **chromosomes**. Mules and hinnies receive nonmatching **genetic** information from their parents: thirty-two horse chromosomes from one parent and thirty-one donkey chromosomes from the other, none of which match one another.

By contrast, non-hybrid animals end up with a matched set of chromosomes. For instance, a horse receives one set of thirty-two chromosomes from Mom and another set of thirty-two from Dad. Every cell in the horse's body has two copies of every chromosome, one from Mom and one from Dad.

In mules and other hybrid animals, Mom's chromosomes are different from Dad's. The mule's chromosomes still contain all the information it needs to survive. That's actually pretty amazing when you consider that the mule doesn't get two copies of any of its chromosomes. However, those mismatched chromosomes make it nearly impossible for mules to make reproductive cells—or **reproduce**.

Human-Made Hybrids

People have been intentionally breeding hybrid animals—such as mules and hinnies—since ancient times. Mules are hardier and more sure-footed than horses. They are also easier to care for because they are less **susceptible** to heat and less prone to injury.

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

This foal is a cross between a zebra and a donkey.

Beefalo, another recent hybrid, were created to combine 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 the 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, with more protein than beef. Beefalo are able to reproduce, whereas zebroids, like mules, are usually sterile.

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

Ligers never occur naturally since lions and tigers live in different habitats. Accredited zoos avoid **interbreeding** the big cats; independent breeders, however, sometimes raise big cat hybrids as curiosities. Other big cat hybrids include

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

leopons (leopard × lion), *jaguleps* (jaguar × leopard), and *lijaguleps* (lion × jagulep). Although the males of all big cat hybrids are almost always sterile, the females can usually bear offspring.

Until recently, people could only obtain hybrids of 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 when 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.

The world's first female cama stands next to her llama mama.

Natural Hybrids and the Tricky Definition of Species

You might have the impression that hybrids only occur when humans breed them intentionally, but that's not the case. Hybrids can arise whenever related species interbreed—which can occur whenever they live and interact in the same environment. Identifying hybrids can be surprisingly difficult, though, because it's surprisingly difficult to define when animals are separate species.

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.

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.

Sometimes the line between hybrids and distinct species can be difficult to determine. *Ring species* provide a great example of this situation.

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. 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 you see 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.

Seven Salamanders

The *Ensatina* salamanders of California all descended from the same Oregon ancestors. As the species spread southward, it adapted to specific, varied environments and evolved into distinct species that formed a ring around the San Joaquin (wah-KEEN) Valley. These species all have slight differences but are similar enough to interbreed with their immediate neighbors—except at the point where their extremes overlap. In southern California, *Ensatina eschscholtzii* and *Ensatina klauberi* do not interbreed. The ring is broken.

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 one or both 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, which is warming two to four times faster than the rest of the world. Animal species native to the Arctic region 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.

Southern flying squirrels, such as this one, are heading north and mating with northern flying squirrels. The two species are similar enough that their offspring are able to reproduce.

As a result, species that used to be geographically separate—such as grizzly and polar bears—are now interbreeding. 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, with increasing frequency, which suggests that grizzlies and polar bears are interbreeding fairly frequently in the wild. At least one was a second-generation hybrid, which indicates that the hybrids are able to reproduce.

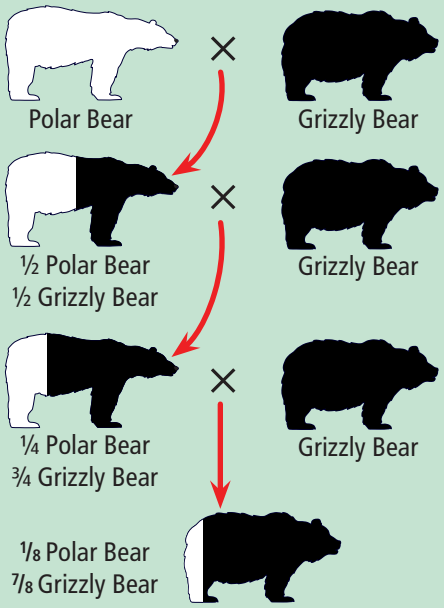
While not a confirmed grolar bear, this bear's body shape, short neck, and odd face (when compared to other polar bears) suggest that it is a grizzly-polar hybrid.

What's the Big Deal?

So grizzlies and polar bears might have some little 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, a few hybrids wouldn't much matter. The problem is that polar bears are at risk of going extinct, so every polar bear birth makes a difference. Every polar bear that breeds with a grizzly is a polar bear that isn't bringing more polar bears into the world.

The Problem with Hybrids and Threatened Species



If one species greatly outnumbers another, hybridization can overwhelm the one with fewer numbers. Every time a polar bear or polar bear hybrid breeds with a grizzly, the polar bear genes become further diluted. Unless polar bears breed with other polar bears as much as—or more than—they breed with grizzlies, they could simply disappear.

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 large quantities of milk (an ability limited to mammals)?

Spider silk is hypoallergenic and antimicrobial, as well as stronger and more flexible than steel or Kevlar. It's ideal for many medical uses, including creating artificial ligaments or nearly invisible stitches for use during eye surgery.

Unfortunately, a single ounce of spider silk requires fourteen thousand spiders. Since spiders tend to eat their neighbors, large-scale "spider farms" are out of the question. Instead, scientists used genetic engineering techniques to insert silk proteins from the golden orb weaver spider into goat **DNA**. Goats then produce the spider silk proteins in their milk, and scientists extract those proteins in the lab. Someday, researchers hope to engineer goats that can produce commercially useful amounts of spider silk.

Since spider genes were artificially introduced—inserted into goat **embryos** in the laboratory—"spider goats" are considered **transgenic** rather than hybrid animals.

These "spider kids" are twins: Armstrong (left) and Sweet Pea (right).

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, but 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 tend to be 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 changing 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 such as the polar bear? Or are they nature's way of speeding up the adaptation process, 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. 13)

chromosomes *(n.)* rod-shaped structures inside cells that carry genes (p. 5)

DNA *(n.)* a code that carries genetic information about a living thing; abbreviation of deoxyribonucleic acid (p. 17)

embryos *(n.)* unborn offspring in the early stages of growth (p. 17)

fertilize *(v.)* to combine male and female reproductive cells to create a new animal or plant (p. 9)

genetic *(adj.)* having to do with heredity and variation in living things (p. 5)

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. 7)

offspring *(n.)* a person's child or another animal's young; descendants (p. 5)

reproduce *(v.)* to make offspring that are similar to the original living thing (p. 6)

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

sterile *(adj.)* not able to produce offspring (p. 5)

susceptible *(adj.)* easily affected or influenced; vulnerable (p. 6)

test tube *(n)* a narrow glass tube that is closed at one end and open at the other end, commonly used in scientific laboratories (p. 9)

transgenic *(adj.)* of or relating to an organism whose DNA has been altered by the transfer of genes from another species or breed (p. 17)