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Hybrid Case Study: Creating new species from old

Objective: Determine and identify reasons why some hybrid species are able to reproduce while other hybrid species cannot. Connect hybridization to climate change and conclude its affect on the survival of species.

Introduction: Welcome to the Department of New Species,where it is your job as a Zoologist to study new species and create a profile on them.

Our scientists believe that increased hybridization in the wild is one of the many alarming consequences of climate change. It is now widely accepted by the scientific community that the intensification of human activity on the planet and our unsustainable consumption patterns are causing climate change. Particularly affected by this, the Arctic is warming between two and four times faster than the rest of the planet, causing glaciers and ice caps to melt and sea levels to rise. These physical alterations to the arctic landscape mean that endemic (native) species are forced to roam further, expanding their ranges and thus encountering species they otherwise wouldn't. Scientist suspect there are at least 30 species undergoing hybridization due to climate change.

Instructions: Read the description of each hybrid animal and it parents. Then provide the following information on the *Species Profile Sheet*.

- Hybrid Name
- Hybrid Chromosome Count
- Parent 1 Species and Parent 2 Species
- Parent 1 Chromosome Count and Parent 2 Chromosome Count
- Hybrid Ability to reproduce
- Physical Description of Hybrid

Once each animal is profiled and the analysis is complete, read the conclusion and answer the questions that follow. Answers must be in full and complete sentences.

Vocabulary Terms:

Fertile: The ability to produce offspring; power of reproduction.

Infertile: The inability to reproduce or produce offspring.

Sterile: Incapable of producing offspring; not producing offspring.

Note
*Chromosome Count is denoted as 2n

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A.

1. **Hybrid Name**_____
2. **Hybrid Chromosome #**_____
3. **Parent 1**_____ **Parent 2**_____
4. **Parent 1 Chromosome #**_____ **Parent 2 Chromosome #**_____
5. **Hybrid Offspring is:** Fertile / Infertile
6. **Hybrid Physical Description**
   - _____
   - _____

B.

1. **Hybrid Name**_____
2. **Hybrid Chromosome #**_____
3. **Parent 1**_____ **Parent 2**_____
4. **Parent 1 Chromosome #**_____ **Parent 2 Chromosome #**_____
5. **Hybrid Offspring is:** Fertile / Infertile
6. **Hybrid Physical Description**
   - _____
   - _____

C.

1. **Hybrid Name**_____
2. **Hybrid Chromosome #**_____
3. **Parent 1**_____ **Parent 2**_____
4. **Parent 1 Chromosome #**_____ **Parent 2 Chromosome #**_____
5. **Hybrid Offspring is:** Fertile / Infertile
6. **Hybrid Physical Description**
   - _____
   - _____

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D.

1. **Hybrid Name**_____
2. **Hybrid Chromosome #**_____
3. **Parent 1**_____ **Parent 2**_____
4. **Parent 1 Chromosome #**_____ **Parent 2 Chromosome #**_____
5. **Hybrid Offspring is:** Fertile / Infertile
6. **Hybrid Physical Description**
   - _____
   - _____

E.

1. **Hybrid Name**_____
2. **Hybrid Chromosome #**_____
3. **Parent 1**_____ **Parent 2**_____
4. **Parent 1 Chromosome #**_____ **Parent 2 Chromosome #**_____
5. **Hybrid Offspring is:** Fertile / Infertile
6. **Hybrid Physical Description**
   - _____
   - _____

F.

1. **Hybrid Name**_____
2. **Hybrid Chromosome #**_____
3. **Parent 1**_____ **Parent 2**_____
4. **Parent 1 Chromosome #**_____ **Parent 2 Chromosome #**_____
5. **Hybrid Offspring is:** Fertile / Infertile
6. **Hybrid Physical Description**
   - _____
   - _____

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Conclusion

The Dangers of Hybridization

While some extent of hybridization occurs in the natural course of evolution, many species have specifically developed vastly different physical appearances, behaviors, mating signals and calls to specifically avoid crossbreeding. Moreover, related species often inhabit geographically distinct habitats to prevent intermixing. Unfortunately, “human activity can break down the barriers that separate species.”

Hybridization can seriously hamper biodiversity by causing species extinction. This is because most hybrid animals are **sterile**. “But even more threatening to species preservation are hybrids that can reproduce,” according to a University of Missouri study. It cites the example of displaced Midwestern barred owls settling in a forest home to endangered spotted owls. The two species have bred — creating sparred owls — which could trigger the spotted owl’s extinction. Hybrids can thus result in a loss of genetic diversity. Furthermore, unlike the species from which they are born, they are offered no protection under the Endangered Species Act. Another negative consequence of crossbreeding is the potential maladaptation of the hybrid animal. Animals develop specific genes that allow them to live in a particular habitat. Sharon Guynup of Missouri University explains this as “nature imposing breeding barriers, safeguards to protect individual species and help them adapt to their environment.” When these genes are mixed through interbreeding, survival traits may be eliminated, leaving animals ill-equipped for their new habitats.

Lastly, just as genetically engineering animals on purpose can cause them a wealth of health issues, hybrids born in the wild can also develop blindness, weak hearts and other faulty organs and brief life spans among other debilitating disorders.Breeding between species usually isn't beneficial when it's caused by accelerated environmental change, because the hybrid animals don't have time to evolve survival traits. "This change is happening so rapidly that it doesn't bode well for adaptive responses."

Conclusion Questions

1. Compare the animals that are fertile, what do they have in common?

2. Compare the animals that are infertile, what do they have in common?

3. What is a likely cause that some hybrids are fertile while other hybrids are infertile?

4. How would the cause in Answer 3 affect a hybrid’s meiosis ability and its ability to reproduce?

5. Why are infertile hybrids problematic?

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6. In what ways do species avoid crossbreeding or hybridization?

7. How is hybridization harmful towards biodiversity?

8. How can hybridization be harmful to an individual's health?

9. How can hybridization affective survival of a species?

10. How does Climate Change affect hybridization?

11. What are some ways humans can decrease hybridization to ensure survival of species?

12. Choose one of the hybrids profiled in the case study and describe how it can negatively affect the parent populations.